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216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY

OFF-PROPERTY INVESTIGATION
INTERIM DATA REPORT

Prepared for:

The 216 Paterson Plank Road Cooperating PRP Group

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1. INTRODUCTION

On behalf of the 216 Paterson Plank Road Cooperating PRP Group (Group), Golder Associates Inc. (Golder Associates) has prepared this Interim Data Report (Report) for the Off-Property Investigation (Investigation) at the 216 Paterson Plank Road Site (Site) in Carlstadt, New Jersey. The Investigation was conducted pursuant to the Final Work Plan Amendment (Work Plan; Golder Associates, 1995) dated December 21, 1995 and approved on February 14, 1996, by the United States Environmental Protection Agency (USEPA). This Report is submitted in partial fulfillment of the reporting requirements set forth in the Work Plan. Administratively, the work is being conducted pursuant to the additional work provisions of an Administrative Order on Consent (Index No. CERCLA II-50114) dated September 30, 1985 (RI/FS Order).

The primary objective of the Investigation is to provide additional information regarding the nature and extent of groundwater contamination within the till and bedrock units. This Report presents the data collected during the Investigation conducted between June and September 1996; and provides recommendations for additional investigations at the Site.

This Report includes the following key elements:

- Section 2 describes the Site, including previous studies, the 1990 Record of Decision, interim remedial measures, and the regional geologic and hydrogeologic settings;
- Section 3 describes the Investigation procedures including installation of 10 monitoring wells; borehole geophysical testing; hydrogeologic testing; groundwater sampling and analysis; and, long-term water level monitoring;
- Section 4 describes the Site geology and hydrogeology based on previous Site data and the new data obtained during the investigation program, and presents results of chemical analyses of groundwater samples collected during the Investigation; and
- Section 5 presents the conclusions and provides recommendations for future investigations at the Site.

These sections are supported by tables and figures which summarize the analytical data and illustrate geologic and hydrogeologic interpretations. Additional supporting information generated from field activities is included in appendices.

2. SITE BACKGROUND

The 6-acre Site is a former chemical recycling and waste processing facility which ceased operation in 1980 and is located in a light industrial/commercial area of Carlstadt, New Jersey (Figure 1). The property is bordered to the southwest by Paterson Plank Road, to the northwest by Gotham Parkway, to the southeast by a trucking company, and to the northeast by Peach Island Creek. The Site was placed on USEPA's National Priorities List (NPL) in 1983.

The following sections provide a brief overview of the major remedial activities conducted at the Site to date.

2.1 Previous Studies

A Remedial Investigation (Dames and Moore, 1990) was initiated in 1987 which evaluated soil and groundwater contamination beneath the Site. Borings were advanced at 30 locations during the remedial investigation and chemical analyses were performed on soil samples from 17 of these borings. In broad terms, the investigation revealed ground conditions comprising fill overlying a clay layer which was in turn underlain by glacial till and bedrock. Fourteen shallow piezometers (P-1 to P-14), and 7 shallow monitoring wells (MW-1S to MW-7S), were installed in the fill zone along with 3 deeper monitoring wells (MW-2D, MW-5D, and MW-7D) as shown on Figure 2.

An initial Feasibility Study was conducted in 1989 by Environmental Resources Management, Inc. (ERM, 1989). The Feasibility Study evaluated remedial alternatives for First Operable Unit (FOU) comprising groundwater and soils/sludge above the clay layer.

A total of nine monitoring wells were installed off-property by Dames and Moore in 1989 pursuant to Project Operations Plan (POP) No. 8 (Dames and Moore, 1988). Five shallow monitoring wells were screened within the fill (MW-8S to MW-12S) and four deeper monitoring wells were installed (MW-8D, MW-11D, MW-12D, and MW-13D). At the specific request of one of the off-Property owners, and with the approval of USEPA, monitoring well RMW-13D was subsequently installed in October 1995 as a replacement for MW-13D. The well installation and boring log was submitted to USEPA on November 20, 1995. Following two rounds of comparative groundwater sampling in RMW-13D and MW-13D, monitoring well MW-13D was decommissioned as part of the Investigation with the approval of USEPA. The well decommissioning form is included in Appendix A.

A deep bedrock monitoring well (MW-2R) was installed on the property by Dames and Moore in 1989 pursuant to POP No. 9 (Dames and Moore, 1988). Dames and Moore also excavated 23 test pits in July, 1989 to evaluate the nature of the fill material. The results are summarized in a report titled Final Report - Excavation of Test Pits (Dames and Moore, 1989).

A Baseline Risk Assessment (BRA) for the Site was conducted by Clement Associates (Clement, 1990) for the USEPA. The BRA followed USEPA guidance for conducting risk assessments current at the time and utilized the information primarily collected during the initial phase of the RI.

2.2 1990 Record of Decision

On September 14, 1990, USEPA issued a Record of Decision (ROD) selecting an interim remedy for the FOU at the Site based on the Remedial Investigation, Feasibility Study, and the BRA. The ROD defined the FOU as "contaminated soils and groundwater above the clay layer" and the selected remedy comprised the following major elements:

- Installation of a slurry wall around the entire Site;
- Installation of an infiltration barrier over the Site;
- Installation of a groundwater collection system, and extraction of groundwater from the FOU zone; and
- Off-Site treatment and disposal of extracted groundwater.

USEPA determined that the selected Interim Remedy would "reduce the migration of hazardous substances, pollutants and contaminants out of the first operable unit zone" and be "consistent with an overall remedy which will attain the statutory requirement for protectiveness."

2.3 Interim Remedial Measures

The Interim Remedy was designed and implemented by the Group pursuant to an Administrative Order (Index No. II CERCLA - 00116) dated September 28, 1990. The Interim Remedy is illustrated in Figure 2 and consists of the following:

1. A lateral containment wall comprising a soil-bentonite slurry wall with an integral high density polyethylene (HDPE) vertical membrane which circumscribes the property;
2. A horizontal "infiltration barrier" consisting of high density polyethylene (HDPE) covering the property;

3. A sheet pile retaining wall along Peach Island Creek;
4. A groundwater extraction system for shallow groundwater consisting of 5 extraction wells screened in the fill which discharge to an above grade 10,000 gallon holding tank via an above grade header system; and
5. A chain link fence which circumscribes the Site.

The design of the Interim Remedy is presented in the Interim Remedy Remedial Design Report (Canonie, 1991) and construction was undertaken between August, 1991 and June, 1992. As part of the Interim Remedy design, 18 soil borings were conducted to evaluate subsurface conditions in the vicinity of the proposed slurry wall. The Interim Remedy construction is documented in the Final Report - Interim Remedy for First Operable Unit (Canonie, 1992).

The Interim Remedy has been in operation since June 1992 and extracted groundwater is regularly shipped, via tanker trucks, to the DuPont Environmental Treatment (DET) facility, located in Deepwater, New Jersey, for treatment and disposal. Between March 1993 and March 1994, the extraction system was not operational because of pump fouling by free phase product (Canonie, 1993).

Maintenance and monitoring of the Interim Remedy is conducted pursuant to the USEPA approved Operations and Maintenance Plan (Canonie, 1991). Quarterly Operations and Maintenance reports are submitted to USEPA which contain the following:

1. Summary of groundwater extraction from the FOU;
2. Summary of Site inspections and maintenance activities;
3. Groundwater levels; and
4. Groundwater and surface water quality results from the quarterly sampling program.

The monitoring program currently consists of thirteen groundwater monitoring wells (MW-2D, MW-2R, MW-5D, MW-7D, MW-8S, MW-8D, MW-9S, MW-10S, MW-11S, MW-11D, MW-12S, MW-12D, and RMW-13D) as shown on Figure 2 and four surface water sampling points in Peach Island Creek. In accordance with correspondence from USEPA dated June 30, 1995, samples are analyzed for Target Compound List (TCL) volatile organic compounds (VOCs) quarterly, and the Target Analyte List (TAL) and TCL compounds annually.

2.4 Regional Geology

The Site is located in the Piedmont Lowland physiographic province of Bergen County and is underlain by interbedded sedimentary and igneous rocks of the Triassic-Jurassic age Newark basin. The Site is situated in a lowland called the Hackensack Meadowlands, a large tidally influenced marsh drained by the Hackensack River and its tributaries which flow south to Newark Bay. The lowland is characterized by flat topography and underlain by the sedimentary rocks. More resistant igneous rocks form prominent northeast-trending strike ridges on either side of the lowland. Much of the original topography of the Hackensack Meadowlands was originally under several feet of tidal estuarine waters. Large portions of the estuary are now several feet above mean sea level as a result of extensive industrialization, landfilling and reclamation, and construction of major roadways including the New Jersey Turnpike. The regional geology is illustrated in Figure 3.

Physiography

The topography and surficial geology in the vicinity of the Site is largely a reflection of man-made fill and unconsolidated deposits related to the Wisconsinan stage glaciation which reached its maximum extent approximately 20,000 years ago during the Pleistocene Epoch (Stanford et al. 1993). Modern day, tidally influenced stream valleys have cut meandering channel networks within the lowlands and a vast array of narrow mosquito-abatement drainage trenches and ditches were cut into the surficial meadow mat during the early historical development of the Meadowlands (USEPA, 1993, Dames and Moore, 1989).

Bedrock outcrops are quite rare in the lowland because of an extensive mantle of unconsolidated glacial deposits and the present topography. The terminal Wisconsinan moraine which was located about 20 miles south of the site in Essex, Hudson and Monmouth counties, has influenced the development of the geologic conditions underlying the site. As the glaciers advanced south, existing drainage courses were modified by glacial erosion and deposition, and locally blocked by ice forming glacial lakes. Deep scoured preexisting bedrock valleys were infilled by the glacial deposits to the west of the Site. The north-south running Kenilworth bedrock valley was scoured down into bedrock to a depth of 250 feet below Mean Sea Level (MSL) and the Overpeck bedrock valley, trending almost parallel with the New Jersey Turnpike and the present day Hackensack River, is as much as 200 feet deep. The bedrock surface rises from the valley axes to a gently undulating, glacially smoothed interfluvial surface which underlies most of the New Jersey Sports Complex and adjacent areas. The bedrock surface may locally rise to within 10 feet of the present

grade, or break through the lowland as isolated "islands", such as Laurel Hill. In the area of the Site, the bedrock occurs at an elevation of 30 feet to 50 feet below MSL. An almost continuous mantle of glacial till overlying the bedrock shows that the buried bedrock valleys, and the broad intervening interfluvies were present prior to glaciation.

During the final, northward retreat of the glacial ice sheet, proglacial lakes dammed behind the terminal moraine inundated the lowlands. Glacial Lakes Hackensack and Bayonne formed about 15,000 years ago, at which time locally up to 200 feet of varved clays accumulated as seasonal (or varved) lacustrine sediments (Parillo, 1959, Stanford et al. 1995). Along the margins of these lakes, coarser grained silts, sands, gravels and occasional boulders were shed into the varved sediments from the surrounding ridges and dropped by floating icebergs. Glacial Lake Hackensack drained into the Atlantic Ocean about 10,000 years ago when the terminal moraine was breached, leaving behind a vast featureless lowland (Averill. et al. 1980).

About 4000 years ago, rising sea level and resultant marine incursions into northern New Jersey converted the lowlands into a vast salt marsh and tidal-flat, drained by the present day Passaic, Hackensack and Rahway Rivers

Stratigraphy

In general terms, the stratigraphic sequence (Stanford et al., 1994; Averill et. al. , 1980) in the Piedmont Lowland Physiographic Province from the youngest to the oldest geologic units can be subdivided as follows:

Unconsolidated Deposits

- **Man-Made Fill:** Consisting of a mixture of soil, sand and gravel, and significant quantities of varying sizes of debris.
- **Marine and Marsh Sediments:** Inter-tidal and Recent fluvial deposits: consisting of fluvial and estuarine sands, silts, clays and gravels overlain by the intertidal silts, clays, salt marsh and meadow-mat deposits;
- **Glacial Deposits:** consisting of stratified glaciolacustrine silts, silty clays and clays, often varved (including the older Glacial Lake Bayonne and younger, Glacial Lake Hackensack deposits), and outwash sands, silts and gravels; the stratified deposits generally overlie unstratified deposits which include glacial till (Rahway Till) and proglacial fan-delta deposits;
- **Pre-glacial Deposits:** consisting of sands, gravels and silts infilling buried bedrock valleys carved by the pre-glacial, ancestral Passaic and Hackensack rivers;

Consolidated Deposits

- Bedrock: consisting of Triassic and Jurassic age, bedded, gently west-dipping, sandstones, siltstones, and conglomerates, interbedded with basalt lava flows and sills of the Newark Basin.

2.5 Regional Hydrogeology

Groundwater in this part of New Jersey is obtained from bedrock and the overlying unconsolidated deposits. The unconsolidated deposits consist of both Recent and Holocene age fluvial deposits, and the underlying glacial deposits. Bedrock aquifers are generally confined by the overlying mantle of unconsolidated deposits. The fluvial deposits, and the glacial deposits form unconfined, semi-confined, and locally confined aquifers. The extent and thickness of discrete water-producing beds within the bedrock aquifer is generally controlled by secondary porosity such as joints, bedding planes and an assortment of other fractures. The hydraulic properties of the bedrock aquifers have been described in detail by Herpers and Barksdale (1951).

The glacial deposits are divided into stratified and unstratified deposits and can form productive aquifers. The glacial deposits consist of boulders, gravel, sand, silt, and clay largely derived from the local bedrock. Glacial tills, when present, generally serve as confining beds to the underlying bedrock. In deeper portions of the glacially scoured bedrock valley, glacial aquifers are developed in the pre-glacial valley fill deposits which consist of moderately- to well-sorted silts, sands and gravels, having been transported by glacial meltwater streams.

Overlying these older glacial deposits are the stratified glaciolacustrine sediments consisting of laminated (varved) clays, silts, very fine-grained sands and occasional gravel. The lacustrine sediments may be described as regional confining beds. Sand and gravel deposited as deltas and fans in the glacial lakes may also locally overlie lake-bottom sediment, resulting in surficial, unconfined glacial aquifers. Recent age overbank flood plain silts and clays, and laterally discontinuous silts and clays of short-lived proglacial lakes may also locally act as confining beds.

3. OFF-PROPERTY INVESTIGATION FIELD WORK

The Investigation was initiated pursuant to the Agency approval of the Final Work Plan Amendment dated December 1995 and entailed the installation of ten monitoring wells; the completion of one deep bedrock pilot boring; borehole geophysical testing; hydrogeologic testing; groundwater quality sampling; and, long-term water level monitoring. All field activities were overseen by the USEPA oversight contractor ICF Kaiser.

Site investigations commenced with the deep bedrock pilot boring (MW-8R) on June 24, 1996. Monitoring well installation and development was completed on August 28, 1996. Borehole geophysical testing commenced on July 9, 1996 in the deep bedrock pilot boring and was subsequently completed on September 26, 1996 with the natural gamma and acoustic (cement-bonding) logging. Hydrogeologic testing commenced with the packer testing of the deep bedrock pilot borehole on July 11, 1996 and was completed on August 29, 1996 with the slug testing of the newly installed till monitoring wells. Groundwater sampling commenced on September 17, 1996 concurrent with the scheduled quarterly Operation & Maintenance (O&M) sampling program and was completed on September 24, 1996. Long-term water level monitoring commenced on October 3, 1996 and was completed on November 25, 1996.

The Site investigation used the following field instruments: Microtip-2000 Photo-ionization detector (PID) and Mini-Rae PID PGM-75 were used for VOC monitoring during the drilling program; Hydac 910 portable water quality meter (pH, temperature, and specific conductivity) and HF Scientific Model DRT-15 Portable Turbidity Meter for monitoring well development; and, Horiba U-10 portable water quality meter (pH, specific conductivity, turbidity, dissolved oxygen, and temperature), Hanna meter (eH), and YSI Dissolved Oxygen Meter for groundwater sampling. All instruments were calibrated, at a minimum, to the operations manual specifications prior to use each day.

Drilling and well installation services were provided by Aquifer Drilling & Testing - MidAtlantic, Inc. of Trenton, New Jersey. Laboratory services were provided by CompuChem Laboratories, Inc. of Chapel Hill, North Carolina and Accutest of Dayton, New Jersey. Borehole geophysical services for the natural gamma and acoustic logging were provided by COLOG, Inc. of Golden, Colorado. Surveying services were provided by GEOD Corporation of Newfoundland, New Jersey.

3.1 Monitoring Well Installation

A total of six till monitoring wells (MW-10D, MW-14D, MW-15D, MW-16D, MW-17D, and MW-18D) and four bedrock monitoring wells (MW-8R, MW-10R, MW-11R and MW-14R) were installed per sections 5.4.2 and 5.4.3 of the Work Plan.

Figure 2 illustrates the location of the monitoring wells and Table 1 summarizes the well construction. Appendix B includes boring and well installation logs and the New Jersey Department of Environmental Protection (NJDEP) Well Certifications-Form A (As-Built Certification) and Form B (Location Certification).

The following sections summarize the procedures used to drill, install and develop the monitoring wells.

3.1.1 Drilling Program

The drill rig, augers and drill stem, rig tools, and well materials were thoroughly steam cleaned upon arrival on-Site, between each borehole and prior to leaving the Site with potable water obtained from a water main located on-Site. A temporary decontamination pad was used to contain water generated from the steam cleaning operations. The water generated from the steam cleaning was disposed of in the on-Site 10,000 gallon leachate holding tank for subsequent off-Site disposal. Drill cuttings/mud generated from the steam cleaning was placed into DOT approved 55-gallon drums and staged on-Site for subsequent disposal.

Bedrock Pilot Borehole - MW-8R

The borehole for MW-8R was completed in several stages. First, a 14-inch diameter borehole was advanced 2 feet into the clay confining unit using hollow stem auger (HSA) drilling techniques. A 10-inch diameter steel casing was then driven 1-foot below the drilled borehole. The annulus between the borehole and the casing was grouted using cement-bentonite grout placed using the tremie method. After a minimum period of twelve hours, fluid within the casing was flushed out and a 9-5/8-inch borehole was advanced to the top of bedrock using HSA and wash rotary drilling techniques. The natural mud from the formations was used as the drilling fluid.

Soil samples were taken during drilling by driving a 2-inch outside diameter (OD) split-spoon sampler a distance of 2 feet at continuous intervals to refusal. Blow counts required to drive the

split-spoon each 6-inch increment were recorded. The total recovery of each sample was measured and the soil classified using the Unified Soils Classification System (USCS) based on visual description only. Soil samples were monitored for the potential presence of VOCs using a PID and readings were recorded on the boring log. A representative portion of each sample was placed in a glass jar and labeled for archive.

Refusal was encountered at 59 feet below ground surface (bgs) from which point further samples were obtained by coring with HQ diamond-bit core barrel with wireline setup. The core barrel seized up and lost circulation at 64 feet bgs. The borehole was augered to 65 feet bgs and drilled to 69 feet bgs using wash rotary. Rock coring resumed at 69 feet bgs and continued until 10 feet of competent bedrock (69 to 79 feet bgs) was cored. It should be noted that although coring began at 59 feet bgs bedrock was not actually encountered until 69 feet bgs. The corehole was then reamed using air rotary techniques (9-5/8-inch diameter borehole). A 6-inch steel casing was subsequently set within the reamed corehole and grouted with a cement-bentonite grout using the tremie method. After a minimum period of twelve hours, fluid within the casing was flushed out and the next 50 feet of bedrock was cored. Ten foot core runs were completed to a depth of 129 feet bgs. Borehole geophysics and packer testing were completed as described in Sections 3.2 and 3.3.

To complete the installation of monitoring well MW-8R, the cored borehole was grouted to a depth of 97 feet bgs with a cement-bentonite grout using the tremie method. After a minimum of 12 hours, the portion of the borehole between the bottom of the 6-inch steel casing and the top of grout was reamed to 5-5/8-inches in diameter using air rotary drilling techniques and an in-line filter. A 3 foot thick layer of filter sand (fine grained sand pack) was placed on top of the grout prior to the installation of the well screen and riser. Monitor well construction details are provided in Section 3.1.2.

Bedrock Monitoring Wells

The boreholes for bedrock monitoring wells MW-10R, MW-11R and MW-14R were also advanced in several stages using generally the same procedures as described above. Several deviations from the Work Plan were necessary based on the field conditions encountered which were approved in the field by ICF Kaiser. These modifications include:

- Monitoring well MW-10R was completed with 2-inch diameter stainless steel well screen and riser due to the poor rock quality; and

- Monitoring well MW-11R was triple cased consisting of 12-inch, 8-inch, and 4-inch steel casing to prevent possible cross-contamination. Contamination was encountered (based on visual and PID readings) at the following depths: 16 to 20 feet bgs and 27.5 feet bgs.

Drilling methods consisted of the following: hollow stem auger for the installation of the outer casings into the clay confining unit for all three monitoring wells; wash rotary to the top of bedrock with the exception of MW-10R in which air rotary was utilized for the installation of the inner casing; and coring followed by reaming using air rotary to complete the boreholes into bedrock for all three wells. The natural mud from the formations was used as the drilling fluid during wash rotary drilling. It should be noted that in all cases the outer casing was installed a minimum of 2 feet into the confining layer and to a depth at which no PID readings were measured on the soils.

Till Monitoring Wells

The boreholes for monitoring wells MW-10D and MW-14D through MW-18D were advanced in several stages using the same general procedures as previously described. No significant modifications to the Work Plan drilling procedures were necessary.

Drilling methods consisted of the following: hollow stem auger for the installation of the outer casings into the clay confining unit for all six monitoring wells; HSA to top of bedrock at locations MW-15D and MW-16D; wash rotary to the top of bedrock at locations MW-10D, MW-17D, and MW-18D; and, air rotary to top of bedrock at location MW-14D. The natural mud from the formations was used as the drilling fluid during wash rotary drilling, except for MW-14D in which bentonite was added to keep the borehole open for well installation. The top 5 feet of bedrock was cored at locations MW-15D and MW-16D to confirm the top of bedrock (at all other locations an adjacent bedrock corehole existed to confirm bedrock elevation).

Drill cuttings and fluids were placed into DOT approved 55-gallon drums and labeled and staged on-Site for subsequent disposal.

3.1.2 Well Installation

Monitoring wells MW-10D and MW-14D through MW-18D were constructed with 4-inch internal diameter well screens and risers and monitoring wells MW-8R and MW-10R were constructed with 2-inch internal diameter well screen and riser. All screens and risers were flush threaded, Schedule 5, Type 304 stainless steel. Well screens were continuous wrap No. 10 slot (0.010-inch). Bedrock monitoring wells MW-11R and MW-14R were completed as open coreholes.

Monitoring wells MW-10D and MW-14D through MW-18D were constructed to provide data from groundwater within the till unit. It should be noted that the original intention of monitoring well MW-18D was to provide data from groundwater within the weathered bedrock zone. However, the pilot bedrock boring (and the other bedrock wells) did not encounter a weathered rock zone. Therefore, monitoring well MW-18D was completed within the lower portion of the till unit.

As per the Work Plan, each till well was to be screened within the most contaminated zone based on PID readings and visual observations during drilling. If no elevated readings and/or visual contamination was observed, the most permeable zone (based on visual assessment of split spoon samples) was to be screened with a maximum screen length of 10 feet. No elevated PID readings and/or visual contamination was observed within the till unit during the drilling of each borehole. The following provides a summary of the resulting till well construction details:

- A 2-foot well screen was used in the construction of monitoring well MW-15D due to the presence of only 6.5 feet thickness of the till unit;
- A 5-foot well screen was used in construction of monitoring wells MW-10D and MW-16D based on a till thickness of 10 and 14 feet, respectively. Although a 10-foot well screen might have been used for monitoring well MW-16D, it was decided to use only a 5-foot well screen in order to ensure there was isolation from the underlying bedrock and the overlying varved clay unit. As such, the well screen was placed across the more permeable portion of the till unit which had a thickness of only 6.5 feet.
- A 10-foot well screen was used in construction of monitoring wells MW-14D and MW-17D. Monitoring well MW-14D was screened from 40 to 30 feet bgs in order to monitor a medium to coarse sand lense encountered from 33.5 to 35 feet bgs. Monitoring well MW-17D was screened from 45 to 55 feet bgs within a portion of the till unit visually identified as being more permeable. Additionally, as no weathered bedrock was encountered, monitoring well MW-18D was installed at depth of 62 to 67 feet bgs to provide additional coverage of the till unit which had a thickness of 31 feet at this location.

Bedrock monitoring wells MW-8R and MW-14R were constructed in accordance with the Work Plan. The construction of MW-10R and MW-11R was modified as described in Section 3.1.1.

All wells, except MW-11R, were completed with 12-inch diameter steel protective flushmount casing. Monitoring well MW-11R was completed with a 24-inch flushmount square vault.

The construction details of each well (total depth, length of well screen, screen interval, and thickness of sand pack) were discussed and approved in the field by ICF Kaiser prior to well installation.

3.1.3 Well Development

Following installation, each well was developed using a combination of a Grundfos Redi-Flo 2 or 3 inch JetSub submersible pump and a surge block. A sand bucket and bailer was initially used to assist with the development of monitoring well MW-15D due to excessive siltation which precluded the initial use of a submersible pump.

Well development forms are presented in Appendix C. The well development procedure and completion of development at each well was approved in the field by ICF Kaiser. The procedure generally involved initially pumping one well volume and then hand surging for approximately five minutes. This procedure was repeated until no further significant improvement was observed through the monitoring of field parameters (turbidity, pH, and conductivity). In addition, approximately two times the volume of water lost in the borehole during coring was removed from bedrock wells MW-10R and MW-11R.

Development water was contained and allowed to settle prior to discharge into the on-Site 10,000 gallon holding tank for subsequent off-Site disposal.

3.1.4 Well Decommissioning

Although not originally part of this Investigation, monitoring well MW-13D, which was replaced with monitoring well RMW-13D in October 1995, was decommissioned on August 11, 1996 in accordance with N.J.A.C. 7:9-9.1 et. seq. and USEPA's letter dated April 5, 1996. The abandonment procedure was approved in the field by ICF Kaiser. The procedure included removing the flush mount casing and driving a split-spoon sampler through the bottom of the well screen in order to remove the well screen and riser. After unsuccessfully attempting to remove the well screen and riser, the well was sealed in place with a cement/bentonite grout using a pressure grout hose placed at the bottom of the well. After the well was sufficiently sealed, the area in which the flushmount casing had been removed was patched with an asphalt material. The well decommissioning form is presented in Appendix A.

3.2 Hydrogeologic Testing

Estimates of horizontal hydraulic conductivity, hydraulic head and potential groundwater flow zones were obtained by conducting packer tests in cored borehole MW-8R. Estimates of horizontal hydraulic conductivity were also obtained by conducting packer tests in cored boreholes MW-11R

and MW-14R. Originally, a packer test was to be completed in cored borehole MW-10R. However, due to the poor quality of the bedrock (low rock quality designation (RQD)), the installation of a stainless steel well screen and riser was necessary in order to keep the borehole open for subsequent groundwater sampling events. Therefore, a rising head slug test was performed at this location. Packer testing commenced on July 11, 1996 at location MW-8R and was completed on August 28, 1996 at locations MW-11R and MW-14R. Details of the packer testing procedures and results are presented in Appendix D and results are discussed in Section 4.0.

Rising head tests were performed in monitoring wells MW-10D, MW-10R, and MW-14D through MW-18D on August 28 and 29, 1996. Details of the testing procedures and results are presented in Appendix D and results are discussed in Section 4.0.

Decontamination of the packer tools, pressure transducers, and submersible pump was performed upon arrival on-Site, between each monitoring well and prior to leaving the Site, following the procedure outlined in the Work Plan.

3.3 Geophysical Testing

Geophysical testing was completed in two phases. The first phase included downhole velocity survey, caliper log, and temperature log in the pilot borehole; and, downhole velocity and downhole camera survey in MW-2D, MW-2R, MW-5D, MW-7D, and MW-11D. This phase of the work commenced on July 9 and was completed on July 11, 1996. As discussed in a letter to the USEPA dated September 17, 1996, a downhole velocity survey was not performed in monitoring well MW-11D due to the presence of NAPL. The first phase of geophysical testing was performed by Golder Associates.

The second phase of the geophysical testing was completed by COLOG, Inc. Acoustic (cement bonding) and natural gamma logging was performed on existing monitoring wells MW-2D, MW-2R, MW-5D, MW-7D, and MW-11D and newly installed monitoring wells MW-14D and MW-18D. This work was performed on September 25 and 26, 1996. Details of the procedures and results are presented in Appendix E and are discussed in Section 4.0.

Decontamination of the geophysical instruments was performed upon arrival on-Site, between each monitoring well and prior to leaving the Site, following the procedure outlined in the Work Plan.

3.4 Groundwater Sampling

The groundwater sampling program included one round of sampling from the newly installed groundwater monitoring wells using the low flow purge technique. Sampling locations are shown in Figure 2, a sampling and analyses summary is provided in Table 2, summary tables of the purging data are presented in Appendix F and the Chain-of-Custody forms are included in Appendix G. The analytical results are presented in Section 4.0. All water generated during purging was collected and discharged into the on-Site 10,000 gallon holding tank for subsequent off-Site disposal.

Groundwater sampling was performed between September 17, 1996 and September 24, 1996 and was conducted concurrent with the scheduled quarterly O&M sampling. Groundwater sampling as part of the Investigation included till wells MW-10D and MW-14D through MW-18D, and the bedrock wells MW-8R, MW-10R, MW-11R, and MW-14R. In addition, a sample of the water source used during the drilling investigation was collected directly from the garden hose used to fill the water tanks for drilling and steam cleaning. It should be noted that the Work Plan allowed for the possibility of collecting a second groundwater sample in monitoring wells MW-5D, MW-7D, and MW-11D from a zone other than the middle of the well screen if discrete flow zones were determined based on the downhole velocity meter survey. The second samples were not collected based on the geophysical results as conveyed to the USEPA in a letter from Golder Associates dated September 17, 1996 and subsequently approved.

Groundwater samples and the potable water sample (PW-01) were analyzed for target compound list (TCL) and target analyte list (TAL) constituents plus cyanide in accordance with the Work Plan. As described in a letter from Golder Associates dated September 17, 1996 to USEPA, additional indicator parameters were also analyzed comprising alkalinity, sulfate, sulfide, methane, ethane, ethene, total organic carbon, chloride, dissolved iron, nitrogen, nitrate, nitrite, and phosphorus.

Well purging and sampling procedures for the low flow purge and sampling technique for the monitoring wells were conducted in general conformance with the Work Plan and with the concurrence with the USEPA oversight contractor ICF Kaiser. Water was purged from each well prior to sampling using a stainless steel Grundfos Redi-Flo 2 submersible pump. Prior to purging and sampling each well, the submersible pump was decontaminated following procedure #2 as set out in Appendix B, Section 6.0 of the Work Plan. Dedicated decontaminated teflon lined

polyethylene tubing was installed in each of the monitoring wells with the exception of monitoring well MW-11D (due to the presence of NAPL in this well). A length of tubing was connected to the submersible pump and the pump was carefully lowered down each well until the bottom rested at the approximate mid-point of the screened interval. Attempts were made to keep the submersible pump from resting on the bottom of the well to minimize the disturbance of any sediment which may have accumulated. The tubing was connected to a flow-through cell into which the portable water quality meter probes were placed for monitoring indicator parameters. The purge and sample depth of each well is summarized in Table 2.

The submersible pump was used to purge and sample water from the well at very low flow rates (approximately 85-1200 ml/min. depending on the well yield). Temperature, pH, eH, specific conductance, turbidity, and dissolved oxygen were monitored continuously as indicator parameters. In addition, water levels were continuously monitored. Once the indicator parameters stabilized to within $\pm 10\%$, over a minimum of two consecutive readings, the water level had stabilized, and a minimum of one volume of the tubing had been removed, the well was considered adequately purged and ready to be sampled. The tubing was then disconnected from the flow-through cell and the pumping rate reduced to approximately 100 ml/min (or lowest achievable pumping rate) prior to sampling. Samples were collected directly from the tubing using the submersible pump.

Quality assurance/quality control (QA/QC) samples were collected to monitor the quality and integrity of the field and laboratory techniques. Six trip blanks (one per day of sampling for volatile organic compounds), two field duplicates at locations MW-14R (MW-14RD) and MW-18D (MW-18DD); six field rinsate blanks (RBGW-01 through RBGW-06); and an MS/MSD (triple volume) at locations MW-2R and MW-11R were collected. The field rinsate blanks included one sample collected per equipment type used for the decontamination event, including one sample per day for the submersible pump. Additionally, ICF Kaiser collected a split sample at location MW-18D and one rinsate blank.

3.5 Analytical Testing and Validation

Groundwater samples were analyzed for TCL and TAL parameters by CompuChem Laboratories and for additional indicator parameters by Accutest. Specific conductance, temperature, pH, eH, dissolved oxygen, and turbidity were measured in the field by Golder Associates personnel. The analytical methods for TCL/TAL and indicator parameters are outlined in Table 2.

Strict quality assurance and quality control (QA/QC) measures were taken to ensure sample integrity and to maintain confidence in the resultant data as described below:

1. **Sampling Techniques:** Dedicated teflon lined polyethylene tubing for all monitoring wells and rigorous decontamination of the submersible pump in accordance with procedure #2 as specified in Appendix B, Section 6.0 of the Work Plan.
2. **Sampling Containers:** The container type and size were used as specified in the Work Plan for compatibility with the sample media and analyte. Aqueous samples were preserved in accordance with the Work Plan.
3. **Samples:** Numerous quality assurance and control samples were taken during sampling consisting of trip blanks, field rinsate blanks, field blind duplicates, and MS/MSDs. In addition, sample splits were collected by the USEPA oversight contractor. Trip blanks were prepared each day when taking an aqueous sample for volatile organic analysis. Field rinsate blanks were prepared each day for each type of sampling equipment used. Field duplicates were taken at a frequency of one per 20 samples. MS/MSD samples were prepared in triple volume at a frequency of one per 20 samples. A summary of the QA/QC samples is given in Table 2.
4. **Documentation:** Documentation of the sampling event consisted of chain of custody forms and field sampling logs or Sample Information Collection forms.
5. **Laboratory:** The QA/QC procedures for CompuChem were followed as presented in the Work Plan.

All data was validated in accordance with the appropriate USEPA Region II Standard Operating Procedure as outlined in the Work Plan. Narratives discussing the results of the data validation for the newly installed monitoring wells are included in Appendix H.

3.6 Water Level Monitoring

Synoptic and continuous groundwater and surface water level measurements were collected during the Investigation to assess variation in groundwater and surface water levels and to evaluate tidal and other influences at the Site.

Synoptic groundwater level measurements were collected from all monitoring wells using a electronic water level meter on September 17, 1996. The water level meter was field decontaminated prior to each use by rinsing the probe with distilled water. Measurements to the depth of water were made in each monitoring well to the nearest 0.01 foot relative to a survey mark at the top of the inner casing. This measurement was converted to a water level elevation based upon the surveyed elevation of the inner casing.

Continuous long-term water level measurements were collected from a total of 12 monitoring wells for a duration of approximately seven weeks between October 3, 1996 and November 25, 1996 using In-Situ TROLL® SP2000 pressure transducers and data loggers. The pressure transducers and data loggers were field decontaminated and installed below the water table in monitoring wells MW-2D, MW-2R, MW-5D, MW-7D, MW-8R, MW-10D, MW-10R, MW-11R, MW-14D, MW-14R, MW-16D, and MW-17D. Additionally, one pressure transducer and data logger was placed in a stilling well (PIC) in Peach Island Creek immediately adjacent to the Site to monitor creek level fluctuations. The depth to water was manually confirmed at each location with an electronic water level meter before installing and removing the logging equipment. Water level information was collected automatically at 1 hour intervals over approximately seven weeks. It should be noted that slight modifications to the water level monitoring program were implemented to enhance the program based upon information obtained during the drilling program. The modifications were discussed in a letter from Golder Associates to the USEPA dated September 17, 1996 which was subsequently approved.

The results from the continuous water level measurements are presented in Appendix I and are discussed in Section 4.0.

4. OFF-PROPERTY INVESTIGATION RESULTS

4.1 Site Geology

The subsurface interpretation presented here is based on previously completed investigations at the Site and off-Property (Dames and Moore, 1989; Canonie, 1990; Golder, 1995) and data obtained during the present Investigation. The stratigraphy at the Site consists of the following units, from youngest to oldest:

1. Man-Made Fill;
2. Marine and Marsh Sediments;
3. Glaciolacustrine Varved Deposits;
4. Glacial Till; and
5. Bedrock.

All subsurface units directly over bedrock, including man-made fill, are considered in this Report as overburden. These overburden units are unconsolidated, and generally flat lying. A brief description of each geologic unit is provided below, a conceptual block diagram of the Site geology is presented as Figure 4, and geological/hydrogeologic cross-sections are presented on Figure 5.

4.1.1 Man-Made Fill Unit

The unit directly underlying the site area consists of miscellaneous man-made fill material. The fill is about 3 feet thick near Peach Island Creek and increases to about 11 feet near Paterson Plank Road. At the Site, the miscellaneous fill consists of a mixture of soil, sand and gravel, and substantial quantities of varying sizes of construction and demolition debris, asphalt, steel girders, wire, concrete blocks, bricks, timber, etc. The variable composition results in a highly erratic response to split spoon penetration as shown by the variation in the Standard Penetration Test (SPT) blow counts.

4.1.2 Marine and Marsh Unit

A "meadow mat" or peat, organic silt and clay intermixed with sand is the youngest natural material underlying the Site. The peat is of variable thickness ranging from 0 (e.g., MW-12D and RMW-13D) to as much as 7 feet near Peach Island Creek. The varying thickness of the peat layer may be due to uneven loading or placement of the fill, localized scouring by modern-day streams, or previous site operations. SPT blow counts are highly variable, ranging from no penetration resistance to as much as 15 where sand stringers are present with the unit.

The base of the peat unit presents a sharp, well defined contact with an organic gray fine-sand, and silt layer that is correlatable with similar deposits across the Hackensack and adjacent lowlands. SPT blow counts range from 5 to as much as 23 in sandier portions or where it grades downward into gravel-bearing interbeds. It is distinguished from the overlying peat unit by color and texture, and highly mottled character.

4.1.3 Glaciolacustrine Varved Unit

The youngest glacial deposits intercepted are of glaciolacustrine origin, herein referred to as the glaciolacustrine varved unit. The glaciolacustrine varved unit can be correlated with the varved silts, and silty clays of Glacial Lake Hackensack, although the lower portions may belong to the Glacial Lake Bayonne stage (see Stanford and Harper, 1991). Based on the present investigation, this unit has been broadly subdivided into the following horizons:

- a. An upper, stiff to medium stiff, bedded, varved horizon which is significantly sandier than the lower horizon. This horizon also displays distinct banding by stringers and intercalation of silty sand and silt.
- b. A lower, very soft to soft, highly plastic clayey horizon. This horizon consists of a clayey silt to massive clay, wherein the varved nature is more difficult to recognize because of the higher clay content.

The boundary between these two horizons is sharp, recognizable by a marked drop in the SPT blow counts when the lower horizon is encountered. Additionally, the upper horizon is generally lighter reddish brown in color with local variagated tones that may be grayish, brownish gray or gray with distinct alternating seams and stringers of fine sand and silt. The lower horizon is characteristically brown, brick red to purple in color and is characterized by silty clay and clay. At several locations, such as at MW-11D and MW-12D, a basal sand and gravel intercalation has been reported, and at MW-2D a local zone of silty-sand with trace gravel was encountered in the middle portion of the varved unit.

Based on a review of the published literature, the elevation across the site, and the lithologic character, the two horizons may be considered to be different facies (Stanford, 1994) of glaciolacustrine deposition, and/or the result of weathering and desiccation of the upper zone glaciolacustrine deposits in the Hackensack lowlands (Averill et al. 1980, Argon, 1980, Harris, 1972).

The glaciolacustrine unit ranges in thickness from 0 feet (south corner of the Site) to about 28 feet (near Peach Island Creek). The geotechnical properties, particularly the SPT blow counts are distinctly different between the two horizons. The SPT blow counts are generally lower than 2 in the lower horizon. The uniform lithology and plastic nature of the fat clay precludes recognition of varves in some portions of the lower horizon. The upper horizon is generally stiffer with blow counts as high as 24, indicating a generally coarser texture with intercalated seams of silt and sand, and possibly desiccation (see Averill et al. 1980, Harris, 1972). No evidence of desiccation was noted during the present subsurface investigation, other than the variagated coloration mentioned above.

The top surface of the lower clay horizon surface, as shown on Figure 6, is gently undulating and rises to an elevation of about -6 feet MSL in the central area of the Site (-5.4 feet MSL at MW-2R). The lower horizon surface falls in elevation in each direction from this point. In the eastern part of the Site, a north-trending trough is evident along MW-8D, MW-7D (top of lower horizon at -10.9 feet MSL), and MW-14R (elevation -10.6 feet MSL). The top of the lower clay horizon also falls to the west to a low centered at MW-11D (elevation -13.6 feet MSL). Neither the upper horizon nor the lower horizon were intercepted at the location of B-6 and B-7 located in the south corner of the Site (Canonie, 1990). Based on a review of the data on the underlying Glacial Till unit (see section below), it appears that the Glaciolacustrine Varved sediments may not have been deposited in this area, as a result of a higher glacial till elevation than the level of glacial lake sedimentation. The pattern of thickness variation of the lower horizon corresponds to the undulation of the top of the underlying Glacial Till. In broad terms, the lower horizon is thinner (or absent) along a northwest trending zone parallel with B-6, B-7, MW-2R (7.3 feet thick), and MW-11R (8 feet thick). Its thickness increases both to the southwest (16 feet in thickness at MW-10D), east (11 feet thick at RMW-13D, 11.3 feet thick at MW-14D), and it is 18 feet thick at MW-7D and 21.7 feet thick at MW-8R northeast of the thin-zone mentioned above.

4.1.4 Glacial Till Unit

Informally correlated with the Rahway Till (Stanford et al, 1994), this unit consists of a heterogeneous mixture of red, yellow-brown, reddish-brown, and reddish-gray clay, silt, sand, and gravel. The glacial till is generally considered to be massive, however, the SPT blow counts recorded for the glacial till unit are highly variable. At several locations (see Figure 5) a softer glacial till has been recognized to overlie a much harder, overconsolidated glacial till. At other

locations (see cross section A-A' at MW-12D and MW-8D, and cross section B-B' at MW-15D) the softer till horizon has not been intercepted. The overconsolidated glacial till is a distinct horizon which is characteristic of a basal, lodgement till (see Lutenecker et al. 1983; Averill et al. 1980). SPT blow counts range from 60 up to 200. The softer till displays significantly lower blow counts, ranging from 20 to 30.

Based on the above observations the glacial tills beneath the Site can be subdivided as follows:

- a. The upper horizon of the Glacial Till unit is herein informally called the *Soft Till* and ranges in thickness from 0 to 11 feet; and
- b. The overconsolidated lower horizon is called the *Lodgement Till* and ranges in thickness from 2 to 30 feet.

The Lodgement Till displays a composition which is similar to the bedrock with clasts entirely composed of the underlying siltstone or sandstone, set in a clayey silt or silty clay matrix. In the Soft Till, however, the clasts may also include metamorphic rock fragments such as quartzite and gneiss and occasional well rounded to subrounded quartzite gravel.

4.1.5 Bedrock Unit

The bedrock beneath the Site area has been assigned to the siltstone-mudstone-sandstone facies of the Passaic Formation (Parker, 1994). It consists of fining-upward sequences of intercalated massive siltstone and mudstone and laminated siltstone with occasional interbeds of micaceous, fine to medium grained sandstone. The bedrock is brick red, reddish brown or brown in color, and this coloration dominates all overlying glacial deposits. Distinctly cross-bedded and ripple laminated, fissile siltstone horizons occur dispersed throughout the unit. Nodules of carbonate (dolomite and calcite) are common throughout the mudstones and siltstones, and in the latter, bedding plane partings and hairline fractures are commonly coated with carbonate deposits. Discrete beds bearing the carbonate material have been selectively dissolutioned, resulting in poor rock quality (reflected in RQD indices less than 15%). These horizons with vugs and open cavities where the carbonate material has been dissolved serve as water-bearing zones in the bedrock.

Very few vertical fractures have been intercepted in the off-Property boreholes. Bedding plane partings are open if the carbonate material has been dissolved. Occasionally fractures at angles

with the bedding plane have also been intercepted. Bedding plane dip as determined in all the rock cores collected is essentially sub-horizontal.

4.2 Site Hydrogeology

4.2.1 Continuous Water level Measurements

Continuous water level measurements were recorded in till monitoring wells MW-2D, MW-5D, MW-7D, MW-10D, MW-14D, MW-16D, and MW-17D, bedrock monitoring wells MW-2R, MW-8R, MW-10R, MW-11R, and MW-14R, and Peach Island Creek at location PIC. Water levels were monitored hourly for a period of seven weeks. Appendix I presents charts showing groundwater elevation versus time.

A seven-day cycle of fluctuations was generally recorded for all till wells and bedrock monitoring wells. In general, it appears that the high water levels were recorded on Mondays, while the lowest levels were generally recorded on Friday/Saturdays. This observation indicates that the water levels may be influenced by an extraction well(s) operating during the week and idling on the weekends. Additionally, an approximate 12-hour fluctuation was also recorded in till monitoring wells MW-2D, MW-5D, MW-14D, and MW-16D and all bedrock monitoring wells which coincides with fluctuations observed from the data collected from the stilling well (PIC) located in Peach Island Creek. The remaining till monitoring wells, MW-7D, MW-10D, and MW-17D do not clearly exhibit this fluctuation.

4.2.2 Groundwater Flow Direction

Interpreted groundwater contour maps were constructed using only the monitoring wells that were part of the long term monitoring program in order to use truly synoptic water levels avoiding the effect of the seven-day and 12-hour fluctuations observed. Based on a number of groundwater contour maps developed using data from different time intervals (e.g. during high and low tide and various plots from Monday through Saturday) it is apparent that the 12-hour tidal fluctuation does not significantly affect groundwater flow direction. However, the weekly variations do impact flow directions. Groundwater maps for both units using water levels recorded on specific Mondays and Fridays are presented on Figures 7 and 8. Additionally, because only a select number of till wells were equipped with continuous water level recorders, manual water levels were collected from additional till wells to provide additional coverage on Friday November 22, 1996. The manual

water levels were collected over as short a time as possible corresponding to the measurement time of the automatic recorders.

Till Unit

The potentiometric surface on Mondays indicates that the groundwater flow direction is towards the west/northwest and on Fridays trends towards the north.

Bedrock Unit

The potentiometric surface on Monday, October 14, 1996 indicates that the groundwater flow direction is towards the northwest. The potentiometric surface on the other dates shown indicates an overall general trend towards the north.

4.2.3 Hydraulic Gradients

Based on the groundwater contour maps, horizontal hydraulic gradients, average approximately 1×10^{-3} ft./ft. for the till unit and 6×10^{-4} ft./ft. for the bedrock unit.

The vertical hydraulic gradients between the clustered monitoring wells are illustrated in Appendix I. As indicated by the charts, vertical gradients between the till and bedrock units at well clusters MW-10D/MW-10R and MW-2D/MW-2R are variable and indicate slightly upward and slightly downward gradients at differing times. The data for well cluster MW-17D/MW-8R indicates slightly downward gradients until the last week of monitoring during which the potentiometric surfaces for the two units are essentially equal. Slightly downward gradients are observed at well cluster MW-14D/MW-14R during most of the monitoring.

4.2.4 Hydraulic Conductivity

Hydrogeologic testing (packer and slug testing) to estimate horizontal hydraulic conductivity was completed in all wells installed as part of the Investigation. The analysis sheets and tables of data collected during the field program are presented in Appendix D. A summary of the results of the hydraulic conductivity testing is presented in Table 3. The till hydraulic conductivities range from 3.2×10^{-6} cm/s (0.009 ft./day) at location MW-10D to 7.1×10^{-4} cm/s (2.01 ft./day) at location MW-16D with a geometric mean value of 7.0×10^{-5} cm/s (0.2 ft./day). The bedrock hydraulic conductivities range from 3.1×10^{-5} cm/s (0.087 ft./day) at location MW-8R to 1.2×10^{-2} cm/s (33.17 ft./day) at location MW-11R with a geometric mean value of 4.3×10^{-4} cm/s (1.23 ft./day).

4.2.5 Groundwater Flow Velocity

An estimate of average linear groundwater flow velocity (\bar{v}) was made using the following equation:

$$\bar{v} = \frac{ki}{n}$$

where:

- | | | |
|-----|---|--|
| k | = | 0.20 ft./day, the estimated geometric mean of hydraulic conductivity in till unit and 1.23 ft./day for the bedrock unit; |
| i | = | 0.001 ft/ft, average horizontal hydraulic gradient for the till unit and 0.0006 ft/ft for the bedrock unit; and, |
| n | = | 10% estimated porosity for a glacial till (Fetter, 1980) and 5% for fractured bedrock (Freeze and Cherry, 1979). |

The resulting estimation of the average linear groundwater flow velocity for the till unit is 0.002 ft./day (0.73 ft./year) and 0.015 ft./day (5.4 ft./year) for the bedrock unit. It should be noted that the linear velocity predicted in this way is based on a uniform porous medium approximation and may not accurately predict fracture controlled velocities within the bedrock units.

4.3 Borehole Geophysical Results

As stated previously, the geophysical investigation was completed in two phases. The first phase was completed by Golder Associates personnel from July 9 through July 11, 1996 and consisted of downhole video, caliper (borehole diameter), and heat pulse flowmeter measurements. The second phase of the investigation was performed by Colog Inc. of Golden Colorado under the supervision of Golder personnel. Testing for the second phase included cement bonding and natural gamma tests to confirm well construction and determine the quality of the grout seals. This testing was performed on September 15 and September 16, 1996.

Downhole Video, Caliper, and Heat Pulse Flowmeter

The downhole video survey was performed to inspect the well screens and casings in the screened wells, to inspect the open interval of well MW-2R, and to confirm the well construction of the wells. The downhole video survey of wells MW-2D, MW-2R, MW-5D, and MW-7D indicated that the well construction diagrams for these well were consistent with the actual conditions. The video camera survey of MW-11D confirmed the presence of NAPL in the well and suggested that the top of the well screen was at an elevation approximately 1 foot higher than the well construction

diagram indicates. The downhole video of the open borehole portion of well MW-2R indicated bedrock visually similar to that of MW-8R.

The results of the caliper testing of wells MW-2D, MW-5D, and MW-7D indicated that the well construction diagrams for these well were consistent with the actual conditions. The caliper test on well MW-2R borehole indicated that there were no substantial cave-ins within the open interval.

The purpose of the heat pulse flowmeter testing was to identify any zones of preferential flow of groundwater within the screened intervals of wells MW-5D, MW-7D, MW-11D, and borehole MW-8R. As discussed previously in a letter from Golder Associates to the USEPA dated September 17, 1996, a downhole velocity survey was not performed in monitoring well MW-11D due to the presence of NAPL. The results of the tests in the other wells indicated that there were no significant flow contrasts within the screened intervals of these wells. Heat pulse flow meter testing was also performed in MW-8R prior to packer testing. The results of the survey indicated a few zones of vertical gradients and these potential flow zones were individually tested by isolating them with the straddle packer tool. The results are presented in Appendix E.

Cement Bonding and Natural Gamma

The cement bonding and natural gamma tests were run on previously installed wells MW-2D, MW-2R, MW-5D, MW-7D, and MW-11D and newly installed monitoring wells MW-14D and MW-18D. These tests were conducted to assess the integrity of the grout in all of the wells and the extent of the bentonite seals in the previously installed wells.

Cement bond integrity is determined using a full waveform sonic logging probe. The downhole probe emits sonic waveforms and a downhole receiver records the sounds reflected from the casing. Unbonded casing tends to ring with a smooth, high amplitude acoustic wave response while bonded casing gives a more muffled response. The grout integrity can be determined by evaluating the amplitude and travel time of the response.

The results of the cement bonding and natural gamma testing are presented in Appendix E. The results indicate that the grout integrity is highly variable with depth. Greater than 60% of the grout of wells MW-5D, MW-7D, MW-11D, MW-14D, and MW-18D is classified as having "Good" integrity. At least 60% of the grout of well MW-2D was classified as either "Fair-Poor" or "Poor". Only 6% of the grout of well MW-2R was classified as having "Good" integrity and this interval

was near the ground surface. 74% of the grout of MW-2R, including the bottom 30 feet, was classified as having "Poor" integrity. Poor grout integrity, especially at the till/bedrock interface could provide a pathway for vertical migration of contaminants.

The natural gamma testing indicated that bentonite seals are present in wells MW-2D, MW-5D, MW-7D, and MW-11D and their locations are generally similar to those indicated in the well construction diagrams.

4.4 Summary of Groundwater Analytical Results

The groundwater chemistry data is presented in Appendix J. A summary of TCL/TAL and cyanide detections is presented on Table 4. The groundwater data was compared to the New Jersey Groundwater Quality Standards (GWQS) adopted January 7, 1993 pursuant to N.J.A.C 7:9-6. Exceedances for those constituents for which a criteria is given are shown on Figures 9 (till unit) and 10 (bedrock unit). As discussed previously, the monitoring wells installed as part of the present Investigation were sampled concurrent with the existing monitoring wells that are sampled as part of the O&M program. Therefore, a summary of the O&M data collected from till and bedrock monitoring wells as presented in the Quarterly Operations and Maintenance Report (Golder Associates, 1996) is also included below and on Table 4 and Figures 9 and 10 for completeness.

Off-Property Investigation Monitoring Wells

The off-Property investigation wells consist of six till monitoring wells (MW-10D, MW-14D and MW-15D through MW-18D) and four bedrock monitoring wells (MW-8R, MW-10R, MW-11R, and MW-14R).

Till Monitoring Wells

VOCs were detected below the GWQS in four of the six till wells. There were no detections of VOCs in monitoring wells MW-15D and MW-17D and only one constituent was detected in wells MW-10D and MW-18D; in both cases at concentrations below the GWQS. There were no detections in the duplicate sample for MW-18D. Chloroform was detected at 3 ug/l at location MW-10D and methylene chloride at 1 ug/l at location MW-18D. For the remaining two monitoring wells, MW-14D and MW-16D, total VOCs were detected at a concentration of 65 ug/l and 151 ug/l, respectively. Tetrachloroethene and trichloroethene were detected at concentrations above the GWQS at location MW-14D and 1,1-dichloroethene, 1,2-dichloroethane, tetrachloroethene, and trichloroethene were detected at concentrations above the GWQS at location MW-16D. Total

VOCs in the potable water sample (PW-01) were detected at a concentration of 34 ug/l with chloroform and bromodichloromethane exceeding the GWQS.

Semi-volatile organic compounds (SVOCs) and pesticide/PCBs were not detected in five of the six till wells. Bis(2-ethylhexyl)phthalate was the only SVOC constituent detected at a concentration of 1 ug/l at location MW-16D. 4,4-DDE, endosulfan II, and endrine aldehyde were detected at concentrations of 0.1 ug/l, 0.1 ug/l, and 0.013 ug/l at location MW-15D, respectively. No SVOCs or pesticide/PCBs were detected in the potable water sample PW-01.

The total metals analyses indicated very few metals exceeded the GWQS with the exception of aluminum (five wells and the potable water sample) and sodium (six wells). Chromium was detected in samples MW-10D and MW-14D above the GWQS at concentrations of 373 and 434 ug/l, respectively. Manganese was detected in samples MW-17D and MW-18D above the GWQS at concentrations of 1,360 and 318 ug/l, respectively. Iron was detected at a concentration of 945 ug/l at location MW-17D. Cyanide was detected in only one sample, MW-14D, at a concentration of 10.9 ug/l which is well below the GWQS of 200 ug/l.

Bedrock Monitoring Wells

Total VOC concentrations ranged from 1 ug/l (MW-14R) to 155 ug/l (MW-11R) with exceedances of the GWQS in samples MW-10R and MW-11R. Chloroform was detected at a concentration of 7 ug/l at location MW-10R which is slightly above the GWQS, although it should be noted that chloroform was also detected in the potable water sample PW-01. Chloroform, 1,1-dichloroethene, 1,2-dichloroethane, tetrachloroethene, and trichloroethene were detected at concentrations above the GWQS in sample MW-11R.

SVOCs were not detected in MW-8R and MW-10R. Phenol was detected at a concentration of 19 ug/l in sample MW-11R and pyrene at a concentration of 1 ug/l in sample MW-14R, both of which are each below the GWQS. Pyrene was not detected in the duplicate sample for MW-14R. Pesticides/PCBs were not detected in any of the wells.

The total metals analyses indicated very few metals exceeded the GWQS with the exception of iron (three wells) ranging from 354 ug/l (MW-10R) to 1,320 ug/l (MW-14R) and aluminum (two wells) at concentrations of 348 ug/l (MW-10R) and 361 ug/l (MW-11R). Chromium and sodium were

detected in sample MW-8R at concentrations of 163 ug/l and 144,000 ug/l, respectively, which exceed the GWQS. Cyanide was not detected in any bedrock well.

Operation & Maintenance Monitoring Wells

The O&M monitoring wells consist of six till wells (MW-2D, MW-5D, MW-7D, MW-8D, MW-11D, MW-12D, and RMW-13D), and one bedrock monitoring well (MW-2R). The analytical data and results of the data review and validation was presented in the Quarterly O&M Report dated December 1996. A summary of the analytical results is presented below and exceedances of the GWQS are shown on Figures 9 and 10.

Till Monitoring Wells

Total VOCs concentrations ranged from 3 ppb in MW-7D to 63,772 ppb in MW-11D and were generally consistent with previous results. The commonly detected VOCs in the till wells were total 1,2-dichloroethene, 1,1-dichloroethene, 1,1-dichloroethane, trichloroethene, tetrachloroethene, and vinyl chloride.

SVOCs were not detected in MW-2D, MW-5D, MW-7D, MW-8D, MW-12D, and RMW-13D. SVOCs were detected in MW-11D at a total concentration of 91 ppb. In MW-11D, low levels of pesticides were detected and PCBs were detected at a concentration of 14 ppb, but these compounds were not detected in any other wells except MW-7D where there was one low level pesticide detect. Inorganics were detected in unfiltered samples in each of the till monitoring wells and the results are generally consistent, with respect to constituents, to those detected historically at individual sampling points.

Bedrock Monitoring Wells

The bedrock zone is monitored by MW-2R. The analytical results indicate a total VOC concentration of 767 ppb including similar compounds to those found in the adjacent till well, MW-2D. There were no detections of SVOCs, pesticides nor PCBs. Inorganics were detected in unfiltered samples at low levels consistent with previous monitoring.

Additional Indicator Parameters

As discussed in a letter to the USEPA dated September 17, 1996, additional indicator parameters were collected from all till and bedrock wells. The analytical results are presented in Appendix J. The purpose for collecting this data was to obtain additional information about the groundwater

geochemistry which may be of value to the assessment of groundwater remedial options, if necessary.

4.5 Well Survey Results

Potable water supply to Carlstadt is primarily provided by the United Water New Jersey Company (formerly the Hackensack Water Company) and is obtained from the impounded northern waters of the Hackensack River. There is no known use of groundwater for potable supply purposes within Carlstadt (USEPA & Army Corps of Engineers, 1995).

A search of water withdrawal points (100,000 gpd) located within a 1/2 mile radius of the Site was performed by the Bureau of Water Allocation of the NJDEP at the request of the Group. The results of this survey indicate no wells are located within 1/2 mile of the Site.

An additional search for all wells (excluding monitoring wells) within a 1/2 mile radius of the Site was also performed by the Bureau of Water Allocation. Figure 11 illustrates approximate well locations within a 1/2 mile radius of the Site and summarizes the well records available from the NJDEP. A total of seven wells were identified, each installed in the bedrock aquifer. Five wells are used for industrial and cooling, one well for lawn irrigation and one well for irrigation. The current status of these wells is unknown as all of the wells were installed over 15 years ago.

In addition, during the Investigation, a representative of the NJDEP from the Bureau of Water Allocation visited the Site on August 27, 1996 and stated that the NJDEP has a Well Record for one well on-Site (location unknown) and one well located adjacent to the monitoring well MW-11 cluster. Both of these wells were believed to have been installed around 1969 and to be bedrock wells, although the precise construction details are unknown. The well located by cluster MW-11 was field located and is not operating based on a visual inspection of the well and a conversation with a representative of the property owner. The location of the former well on-Site is unknown and was likely obscured either prior to or during the construction of the Interim Remedial measures.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The RI data indicated that the on-Site fill materials are impacted by a variety of contaminants including volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs) and metals. VOCs are also present in the shallow groundwater within the fill on-Site, in some cases at concentrations exceeding 10% of solubility for compounds such as tetrachloroethene (PCE) and trichloroethene (TCE). These concentrations are consistent with the presence of free phase product in the fill on the Site as physically observed in the field. Groundwater within the fill is laterally contained by the slurry wall and the aqueous phase is being extracted and treated as part of the Interim Remedy. Based on quarterly water level data, inward gradients within the fill are generally indicated across the slurry wall, except for along Peach Island Creek, where the gradient is towards the Creek.

Previous analytical results have indicated that groundwater in the till and possibly the bedrock is also impacted and is considered to be a potential off-Property pathway for Site related contaminants. VOCs have been historically detected in the deep monitoring wells both on- and off-Property based on the quarterly monitoring results. Semi-volatile organic compounds (SVOCs) have generally not been detected in any of the monitoring wells with the exception of well MW-11D in which relatively low concentrations has been detected. PCBs (Aroclor-1242) have also been consistently detected in well MW-11D. Aroclor 1232 was detected only once in MW-5D in December 1987. Pesticides have not been detected in any of the wells. A wide variety of inorganics have been consistently detected in each well, including naturally occurring compounds.

As discussed in detail in Section 4.4, the groundwater chemistry data for the newly installed off-Property monitoring wells indicates that very few semi-volatile organic and pesticide/PCB compounds are present in either the till and bedrock units with no exceedances of the New Jersey GWQS. Metals were detected consistently in all wells with exceedances of New Jersey GWQS consisting primarily of naturally occurring metals such as aluminum, iron, manganese, and sodium. Therefore, given the results of the off-Property Investigation and historical data, VOCs are the primary focus of this Report.

Significantly lower concentrations of VOCs were detected in the new off-Property monitoring wells as compared to the previously existing monitoring wells. VOCs were detected below the New

Jersey GWQS in four out of the six till wells (MW-10D, MW-15D, MW-17D, and MW-18D) and two of the four bedrock wells (MW-8R and MW-14R). For the remaining till monitoring wells, MW-14D and MW-16D, total VOCs were detected at concentrations of 65 ug/l and 151 ug/l, respectively. Tetrachloroethene, trichloroethene, 1,1-dichloroethene, and 1,2-dichloroethane were the primary contaminants detected in these two wells. For the remaining bedrock wells, MW-10R and MW-11R, total VOCs were detected at concentrations of 8 ug/l and 155 ug/l, respectively. The only constituent detected in well MW-10R at slightly above the New Jersey GWQS was chloroform, although it should be noted that chloroform was also detected in potable water sample PW-01. Tetrachloroethene and trichloroethene were the primary contaminants detected in MW-11R at concentrations of 50 ug/l and 56 ug/l, respectively.

The analytical results from the Investigation indicate that the till unit has not been further impacted to the south, east and west of the Site as indicated by the results of samples MW-18D, MW-10D, and MW-15D, respectively. VOCs, at much lower concentrations, were detected north/northwest (MW-16D) and east/northeast (MW-14D) of the Site. The concentrations detected in these wells were much less (over an order of magnitude) than detected in the RI monitoring wells (e.g. MW-11D, MW-12D, and RMW-13D).

The analytical results for the bedrock unit show very little impact further to the south, north, and east of the Site as indicated by the results of samples MW-8R, MW-10R, and MW-14R. Analytical results for sample MW-11R indicate some impact with total VOCs detected at a concentration of 155 ug/l. However, given the high concentrations of VOCs detected at MW-11D (indicative of the presence of NAPL), adjacent to MW-11R, and the close proximity of a former bedrock water supply well recently identified by a NJDEP Bureau of Water Allocation Representative, the bedrock impact may be the result of local cross contamination.

Continuous water levels collected during the Investigation indicate that downward hydraulic gradients are not prevalent throughout the Site. The vertical hydraulic gradients between the till and bedrock units vary across the investigation area with very slight upward or downward gradients.

The glaciolacustrine varved unit separating the fill from the till and bedrock varies in thickness ranging from 0 to 28 feet. The only area of the Site in which the glaciolacustrine varved confining unit was not intercepted was at slurry wall construction borehole locations B-6 and B-7 (southern

corner of the Site). The glaciolacustrine unit is a predominantly clay soil, and has a hydraulic conductivity on the order of 10^{-7} cm/sec based on RI data. Such a unit, where present, would be expected to act as an effective barrier to the migration of contaminants. However, where this unit is absent or thin, a pathway for the downward migration of contaminants to the underlying till and bedrock units could exist. The borehole logs for B-6 and B-7 did not indicate that contamination was encountered in this area of the Site based on visual observations and PID readings. Additionally, given the hydrologic characteristics of the till and bedrock units (e.g. very low average linear groundwater flow velocity for the till and bedrock units, 0.73 ft./year and 5.4 ft./year, and variable groundwater flow direction) the transport time for groundwater to migrate to impacted wells such as MW-11D/R from the area where the glaciolacustrine unit is absent far exceeds the history of Site operations. As such, there are probably other mechanism(s) that play a role in contaminant transport. As discussed in the Work Plan, and to the extent that the contamination in the deeper units originates from the Site, possible additional mechanism(s) that play a role in the transport of contaminants include:

1. Migration through the glaciolacustrine varved unit, in particular via fractures and sand/gravel stringers.

As discussed in Section 4.1 the glaciolacustrine varved unit can be broadly subdivided into two horizons with the upper horizon being sandier and including distinct banding of sand stringers and intercalation of silty sand and silt (bedded varved horizon) while the lower unit is a much softer and highly plastic massive clay and silty clay which would limit any migration. Consistent with this interpretation, significant contamination was noted in the upper bedded unit only. NAPL was observed within the upper unit at locations MW-11R and RMW-13D. Additionally, elevated PID readings were also observed in this unit at location MW-14D/R. PID readings and visual contamination significantly decrease within the lower varved unit indicating that physio-chemical degradation of the clay material/particles of the glaciolacustrine varved unit has probably not occurred.

2. Deterioration of the well seals, particularly in the presence of free-phase product.

Cement bonding (acoustic logging) tests were completed during the Investigation on RI wells MW-2D, MW-2R, MW-5D, MW-7D, and MW-11D and newly installed wells MW-14D and MW-18D. These tests were conducted to assess the integrity of the grout of the monitoring wells. In summary, only 6% of the grout for well MW-2R was classified as having "good" integrity and this interval was near the groundwater surface. 74% of the grout in this well, including the bottom 30 feet was classified as having "poor" integrity. At least 60% of the grout in well MW-2D was also classified as either "fair-poor" or "poor". The grout integrity for the interval from 19 to 21 feet below ground surface at location MW-11D was classified as "poor". This interval, based on data from MW-11R, intersects the bedded varved unit. Furthermore, the downhole video survey indicates that the top of the well screen was at an elevation approximately one foot higher than the well construction diagram indicates. This

information suggests that well seal deterioration may have contributed to contaminant transport.

3. Utility trenches which may have been excavated into the glaciolacustrine varved unit.

A number of utilities exist along Gotham Parkway including communications, water, gas, storm sewer and sanitary sewer (Carlstadt Sewer Authority and Bergen County Utilities Authority (BCUA)). The Carlstadt sewer line is a gravity fed line which slopes away from Paterson Plank Road and travels underneath Peach Island Creek. As-built data obtained from the Borough indicates that the invert elevation of the sewer line in the vicinity of the Site intercepts the upper bedded varved unit but does not intercept the lower varved unit. The BCUA sewer line is a force main line coming from the New Jersey Sports Authority property and runs along the east side of Gotham Parkway. This sewer line is not as deep but may intercept the upper portion of the upper bedded varved unit in the vicinity of the Site.

Because these utilities intercept only the upper horizon of the glaciolacustrine unit, it is unlikely that they serve as a pathway to the till and bedrock.

4. On-site well or other glaciolacustrine varved unit penetration related to past operational practices.

Based on depositional testimony from a former Site worker and records from the NJDEP, a water supply well existed on the Site, although its location has not been established. In addition, the NJDEP records also indicate a well located by well cluster MW-11. The location of this well was verified during the Investigation but it is not currently operating. Both wells were installed around 1969 and are bedrock wells with open boreholes estimated to be greater than 200 feet in length. These wells could have acted as pathways for contamination to the deeper water bearing units.

5. Groundwater extraction from the till and bedrock in the Site vicinity for industrial use.

The well survey completed as part of this Investigation located seven wells within a half-mile of the Site. The long term water level monitoring showed a seven-day fluctuation with water levels slowly declining during the week and recovering during the weekend. This trend suggests that off-Property pumping impacts the direction of groundwater flow. However, the hydraulic gradients are low so that the resulting average linear groundwater velocity in the till and bedrock units is very low and the impact on contaminant transport is probably limited.

The conclusions described above serve as the basis for the following recommendations for a final phase of off-Property work to complete this Investigation.

5.2 Recommendations

The following recommendations have been developed to: (1) obtain additional data to complete the off-Property groundwater investigation; (2) prevent further potential cross-contamination of the till

and bedrock units; and, (3) assess off-Property contamination within the upper glaciolacustrine bedded clay unit.

1. Installation and sampling of two additional till monitoring wells (MW-19D and MW-20D) north/northwest of Site. Precise locations to be determined following access discussions with appropriate Landowners. Each well will be sampled for TCL VOCs.
2. Installation and sampling of one additional till monitoring well (MW-21D) south of the Site (off-Property near boreholes B-6 and B-7) to provide additional geologic control and data on the groundwater quality within the till unit at the location where the glaciolacustrine confining unit is apparently absent. This monitoring well will be sampled once for TCL VOCs.
3. Decommissioning of off-Property monitoring well MW-11D to eliminate this potential route of cross contamination.
4. Additional long-term water level monitoring incorporating the proposed wells to enhance the understanding of the groundwater flow direction in the till unit.
5. Decommissioning on-Site monitoring wells MW-2D and MW-2R to eliminate this potential route of cross contamination.
6. Redevelop and assess the construction (e.g. depth of well screen interval) and grout integrity of monitoring well MW-8D. The depth to bottom of the well, as measured during the groundwater sampling, does not coincide with the as-built well construction log (difference of approximately 12 feet). The assessment will include downhole video camera and acoustic logging techniques. Decommission well if necessary based on the results of this assessment.
7. Assess monitoring well MW-12D construction (e.g. depth of well screen interval) and grout integrity using downhole video survey and acoustic logging techniques and decommission if necessary.
8. Further investigate off-Property pumping including: determining the location of each active well within a one-half mile radius of the Site concentrating to the north/northwest/northeast of the Site; and, obtain as-built construction details of each well located, the pumping rate and schedule, and use of the extracted groundwater.
9. Notify utilities and property owners of potential contamination within the upper glaciolacustrine bedded unit off-Site and of the need for appropriate precautions should this unit be disturbed.
10. Investigate potential off-Property contamination within the upper glaciolacustrine bedded unit. This investigation will include assessing the lateral extent through field screening techniques (e.g. visual and head space analysis using a PID) and confirmatory laboratory analyses for TCL VOCs, SVOCs, and pesticide/PCBs.
11. Decommissioning of the off-Property former production well located adjacent to well cluster MW-11 to eliminate this potential route of cross contamination.

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12. Decommissioning of the on-Site former production well to eliminate this potential route of cross contamination, if the well can be located.

The details and schedule for these activities will be contingent upon gaining access approval from affected landowners.

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TABLE 1
MONITORING WELL CONSTRUCTION DATA
216 PATERSON PLANK ROAD SUPERFUND SITE
CARLSTADT, NEW JERSEY

WELL ID	DATE OF INSTALLATION	GROUND SURFACE ELEVATION (FT-MSL)	ELEVATION TOP OF INNER CASING (FT-MSL)	WELL DIAMETER & MATERIAL	WELL DEPTH (FT BGS)	SCREEN LENGTH (FT)	ELEVATION TOP OF SCREENED INTERVAL (FT-MSL)	ELEVATION BOTTOM OF SCREENED INTERVAL (FT-MSL)	TOP OF PEAT (FT-MSL)	TOP OF GRAY SILT/ BEDDED CLAY (Upper Horizon) (FT-MSL)	TOP OF VARVED CLAY (Lower Horizon) (FT-MSL)	TOP OF SOFT TILL (FT-MSL)	TOP OF LODGEMENT TILL (FT-MSL)	TOP OF BEDROCK (FT-MSL)	SCREENED INTERVAL FORMATION
REMEDIAL INVESTIGATION MONITORING WELLS															
MW-2D	6/18/87	8.57	12.09	4-INCH SS	61	15	-37.4	-52.4	0.8	-0.8	-5.4	-12.4	-21.4	-51.4	TILL
MW-2R	2/8/89	8.86	11.30	6-INCH OPEN HOLE	88	25	-54.1	-79.1	0.8	-0.8	-5.4	-12.4	-21.4	-51.4	BEDROCK
MW-5D	6/26/87	7.32	10.23	4-INCH SS	62	15	-39.7	-54.7	1.4	-1.6	-6.6	-16.9	-27.7	-52.7	TILL
MW-7D	7/6/87	9.09	11.18	4-INCH SS	60	15	-35.9	-50.9	NOT PRESENT	-0.3	-10.9	-28.9	-35.3	-50.0	TILL
MW-8S	1/5/89	5.50	5.08	4-INCH SS	7.5	5	3.0	-2.0	0.5	-2.0	NA	NA	NA	NA	FILL
MW-8D	1/16/89	5.58	5.24	4-INCH SS	54	15	-33.4	-48.4	0.5	-2.0	-9.9	NOT PRESENT	-39.4	-48.2	TILL
MW-9S	1/4/89	5.95	5.55	4-INCH SS	8	5	3.0	-2.1	1.0	-2.8	NA	NA	NA	NA	FILL
MW-10S	1/3/89	7.82	7.54	4-INCH SS	9	5	3.8	-1.2	NOT PRESENT	-0.4	NA	NA	NA	NA	FILL
MW-11S	1/6/89	6.32	6.04	4-INCH SS	7	5	4.3	-0.7	-1.1	-2.1	NA	NA	NA	NA	FILL
MW-11D	1/23/89	5.76	5.51	4-INCH SS	38	15	-17.2	-32.2	-1.7	-2.7	-9.9	-18.0	-29.2	-33.0	TILL
MW-12S	1/6/89	6.25	5.63	4-INCH SS	7.5	5	3.8	-1.3	NOT PRESENT	-1.6	NA	NA	NA	NA	FILL
MW-12D	1/18/89	6.37	5.85	4-INCH SS	34	15	-12.6	-27.6	NOT PRESENT	-1.4	-8.6	NOT PRESENT	-21.4	-28.0	TILL
RMW-13D	10/20/95	4.88	4.66	4-INCH SS	43.5	10	-28.6	-38.6	NOT PRESENT	0.9	-9.1	-20.1	-24.1	-38.6	TILL
OFF-PROPERTY INVESTIGATION MONITORING WELLS															
MW-8R	7/18/96	5.35	5.11	2-INCH SS	93	10	-77.7	-87.7	0.4	-1.5	-11.7	-33.4	-39.7	-63.7	BEDROCK
MW-10D	8/21/96	7.49	7.09	4-INCH SS	42	5	-29.5	-34.5	0.7	-2.5	-10.5	-26.5	-34.5	-36.5	TILL
MW-10R	8/26/96	7.48	7.01	2-INCH SS	65.5	10	-48.0	-58.0	0.7	-2.5	-10.5	-26.5	-34.5	-36.5	BEDROCK
MW-11R	8/7/96	6.41	6.19	4-INCH OPEN HOLE	58	10	-41.6	-51.6	-1.6	-3.6	-13.6	-21.3	-25.6	-31.6	BEDROCK
MW-14D	7/26/96	2.45	2.19	4-INCH SS	40	10	-27.6	-37.6	-2.6	-6.1	-10.6	-21.9	-30.6	-51.6	TILL
MW-14R	7/23/96	2.37	2.22	4-INCH OPEN HOLE	74	10	-61.6	-71.6	-2.6	-6.1	-10.6	-21.9	-30.6	-51.6	BEDROCK
MW-15D	8/16/96	9.68	9.47	4-INCH SS	52	2	-40.3	-42.3	-0.3	-3.3	-11.3	NOT PRESENT	-37.3	-43.8	TILL
MW-16D	7/29/96	7.25	6.59	4-INCH SS	36	5	-23.8	-28.8	NOT PRESENT	-4.8	-8.8	-16.6	-26.3	-32.8	TILL
MW-17D	7/11/96	5.05	4.75	4-INCH SS	55	10	-40.0	-50.0	0.4	-1.5	-11.7	-33.4	-39.7	-63.7	TILL
MW-18D	7/18/96	5.23	4.51	4-INCH SS	66	5	-55.8	-60.8	0.4	-1.5	-11.7	-33.4	-39.7	-63.7	TILL

NOTES:

- (1) - Well depths and screen length for existing monitoring wells estimated from the Dames & Moore monitoring well details provided in the RI Report.
- (2) - Elevation data for stratigraphy presented for the existing monitoring wells is estimated based on Golder Associates interpretation of the borehole logs prepared by Dames & Moore and provided in the RI Report.
- (3) - Monitoring wells surveyed by GEOD Corporation in October 1996.
- (4) - Elevation data for stratigraphy at cluster monitoring well locations (e.g. MW-14D and MW-14R) is based on information from the deeper monitoring well borehole log.

**TABLE 2
SAMPLING AND ANALYSES SUMMARY
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

SAMPLE POINT ID	SAMPLING DATE	ANALYTICAL PARAMETER (1)	QA/QC (2)		WELL DATA INFORMATION		
			FIELD DUPLICATE	MS/MSD	SCREEN LENGTH (FT)	WELL DEPTH (FT)	PUMP DEPTH (FT)
Groundwater - Off-Property Investigation Monitoring Wells							
MW-8R	9/19/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			10	93	88
MW-10D	9/20/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			5	42	40
MW-10R	9/20/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			10	65.5	60
MW-11R	9/24/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS		X	10	57	53
MW-14D	9/23/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			10	40	35
MW-14R	9/23/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS	MW-14RD		10	74	69
MW-15D	9/20/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			2	52	51
MW-16D	9/23/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			5	36	34
MW-17D	9/19/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			10	55	50
MW-18D	9/19/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS	MW-18DD		5	67	64
Groundwater - Operation & Maintenance Monitoring Wells							
MW-2D	9/17/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			15	61	54
MW-2R	9/18/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS		X	25	88	76
MW-5D	9/18/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			15	62	54
MW-7D	9/18/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			15	60	53
MW-8D (3)	9/18/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			2.4	41.4	40.4
MW-11D	9/24/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			15	38	30
MW-12D	9/23/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			15	34	26
RMW-13D	9/23/96	TCL/TAL, CYANIDE & INDICATOR PARAMETERS			10	43.5	39
Potable Water							
PW-1	9/23/96	TCL/TAL & CYANIDE					

Notes:

- (1) - TCL VOCs, SVOCs, and Pest/PCBs Methodology CLP SOW OLMO3.1, TAL Metals & Cyanide Methodology CLP SOW ILMO3.0.
Indicator Parameters Methodology: Alkalinity (EPA 310.1), Chloride (EPA 325.3), Ethane, Ethene, Methane, Ethene, Nitrate-Nitrite (EPA 353.2), Total Phosphorus (EPA 365.2), Sulfate (SM18 4500SO4C), Sulfide (EPA 376.1), TKN (EPA 351.2), Total Organic Carbon (EPA 415.1), and Dissolved Iron (CLP SOW ILMO3.0).
- (2) - Trip Blanks were taken one per day of sampling for VOCs.
- (3) - Depth of well was sounded at 41.4 feet below ground surface. As-built well construction log indicates this well should be 54 feet deep with a 15 foot well screen.

TABLE 3
SUMMARY OF HYDROGEOLOGIC TESTING RESULTS
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY

WELL	TEST INTERVAL			HYDRAULIC CONDUCTIVITY DETERMINED USING HVORSLEV	
	TOP FT. BGS	BOTTOM FT. BGS	LENGTH FT.	cm/s	ft/day
TILL WELLS:					
MW-10D	35.5	42.0	6.5	3.19E-06	0.009
MW-14D	27.0	41.0	14.0	6.80E-06	0.019
MW-15D	48.5	52.0	3.5	1.53E-04	0.433
MW-16D	27.0	36.0	9.0	7.09E-04	2.010
MW-17D	42.0	55.0	13.0	2.71E-04	0.768
MW-18D	60	66	6.0	1.90E-04	0.537
Geometric mean for till wells:				7.03E-05	0.199
BEDROCK WELLS:					
MW-8R	89.2	98.8	9.6	3.78E-05	0.107
	89.5	99.1	9.6	5.35E-05	0.152
	99.3	109.3	10.0	4.11E-05	0.117
	104.0	113.6	9.6	1.79E-05	0.051
	109.7	119.3	9.6	1.14E-05	0.032
	114.0	130.0	16.0	5.03E-05	0.143
Geometric Mean for MW-8R:				3.08E-05	0.087
MW-10R	55.5	65.5	10.0	1.76E-04	0.498
MW-11R	48.0	58.0	10.0	1.17E-02*	33.165*
MW-14R	64.0	74.0	10.0	5.53E-04	1.568
Geometric mean for bedrock wells:				4.33E-04	1.227

Soft till
 soft + loam
 loam + bedrock
 soft + loam
 loam
 loam

Notes:

* This value is the average of two tests conducted on this well.

TABLE 4
SUMMARY OF CHEMISTRY ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
ORGANIC DETECTIONS - VOLATILES

STANDARD (1)	PARAMETER	MW-2D	MW-2R	MW-5D	MW-7D	MW-8D	MW-8R
		Sampled:9/17/96	Sampled:9/18/96	Sampled:9/18/96	Sampled:9/18/96	Sampled:9/18/96	Sampled:9/19/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
1	Bromodichloromethane	-	-	-	-	-	-
---	Carbon Disulfide	-	-	-	-	-	-
4	Chlorobenzene	-	-	19	-	-	-
6	Chloroform	82	98	160	-	-	5
10	Dibromochloromethane	-	-	-	-	-	-
2	1,1-Dichloroethene	6	3	110	-	25	-
70	1,1-Dichloroethane	8	5	33	-	-	-
---	Total 1,2-Dichloroethene	11	7	650	-	3100	-
2	1,2-Dichloroethane	400	370	110	-	-	-
700	Ethylbenzene	-	-	-	-	88	-
2	Methylene Chloride	13	41	22	-	-	-
30	1,1,1-Trichloroethane	-	-	68	-	-	-
1	Tetrachloroethene	-	2	900	-	160	-
1000	Toluene	-	-	-	-	110	3
1	Trichloroethene	230	200	2500	3	1100	-
5	Vinyl chloride	36	41	32	-	-	-
40	Total Xylenes	-	-	-	-	320	-

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

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Indicates exceedance of the New Jersey Groundwater Quality Standard for a Class IIa aquifer.

"-" indicates that the constituent was not detected as qualified with a "U" or "UJ".

TABLE 4
SUMMARY OF CHEMISTRY ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
ORGANIC DETECTIONS - VOLATILES

STANDARD (1)	PARAMETER	MW-10D	MW-10R	MW-11D	MW-11R	MW-12D	RMW-13D
		Sampled:9/20/96	Sampled:9/20/96	Sampled:9/24/96	Sampled:9/24/96	Sampled:9/23/96	Sampled:9/23/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
1	Bromodichloromethane	-	-	-	-	-	-
---	Carbon Disulfide	-	-	-	-	-	-
4	Chlorobenzene	-	-	-	-	39	-
6	Chloroform	3	7	-	10	-	240
10	Dibromochloromethane	-	-	-	-	-	-
2	1,1-Dichloroethene	-	-	-	3	370	210
70	1,1-Dichloroethane	-	-	-	2	99	94
---	Total 1,2-Dichloroethene	-	-	42	24	4500	2200
2	1,2-Dichloroethane	-	-	-	9	-	210
700	Ethylbenzene	-	-	730	-	84	-
2	Methylene Chloride	-	1	-	-	-	-
30	1,1,1-Trichloroethane	-	-	-	1	110	82
1	Tetrachloroethene	-	-	53000	50	470	410
1000	Toluene	-	-	2200	-	-	-
1	Trichloroethene	-	-	4500	56	2100	1500
5	Vinyl chloride	-	-	-	-	380	92
40	Total Xylenes	-	-	3300	-	48	-

Notes:

Units are in ug/l.

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TABLE 4
SUMMARY OF CHEMISTRY ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
ORGANIC DETECTIONS - VOLATILES

STANDARD (1)	PARAMETER	MW-14D	MW-14R	MW-14R (Dup.)	MW-15D	MW-16D	MW-17D
		Sampled: 9/23/96	Sampled: 9/23/96	Sampled: 9/23/96	Sampled: 9/24/96	Sampled: 9/23/96	Sampled: 9/19/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
1	Bromodichloromethane	-	-	-	-	-	-
---	Carbon Disulfide	-	-	-	-	-	-
4	Chlorobenzene	-	-	-	-	-	-
6	Chloroform	5	-	-	-	1	-
10	Dibromochloromethane	-	-	-	-	-	-
2	1,1-Dichloroethene	-	-	-	-	6	-
70	1,1-Dichloroethane	-	-	-	-	3	-
---	Total 1,2-Dichloroethene	-	-	-	-	30	-
2	1,2-Dichloroethane	-	-	-	-	11	-
700	Ethylbenzene	2	-	-	-	-	-
2	Methylene Chloride	-	-	-	-	-	-
30	1,1,1-Trichloroethane	1	-	-	-	3	-
1	Tetrachloroethene	2	-	-	-	21	-
1000	Toluene	2	-	-	-	-	-
1	Trichloroethene	45	1	1	-	76	-
5	Vinyl chloride	-	-	-	-	-	-
40	Total Xylenes	8	-	-	-	-	-

Notes:

Units are in ug/l.

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TABLE 4
SUMMARY OF CHEMISTRY ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
ORGANIC DETECTIONS - VOLATILES

STANDARD (1)	PARAMETER	MW-18D Sampled: 9/19/96	MW-18D (Dup.) Sampled: 9/19/96	PW-01 Sampled: 9/19/96			
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
1	Bromodichloromethane	-	-	11			
---	Carbon Disulfide	-	-	-			
4	Chlorobenzene	-	-	-			
6	Chloroform	-	-	23			
10	Dibromochloromethane	-	-	4			
2	1,1-Dichloroethene	-	-	-			
70	1,1-Dichloroethane	-	-	-			
---	Total 1,2-Dichloroethene	-	-	-			
2	1,2-Dichloroethane	-	-	-			
700	Ethylbenzene	-	-	-			
2	Methylene Chloride	1	-	-			
30	1,1,1-Trichloroethane	-	-	-			
1	Tetrachloroethene	-	-	-			
1000	Toluene	-	-	-			
1	Trichloroethene	-	-	-			
5	Vinyl chloride	-	-	-			
40	Total Xylenes	-	-	-			

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

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TABLE 4
SUMMARY OF CHEMICAL ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
ORGANIC DETECTIONS - SEMIVOLATILES

STANDARD (1)	PARAMETER	MW-2D	MW-2R	MW-5D	MW-7D	MW-8D	MW-8R
		Sampled: 9/17/96	Sampled: 9/18/96	Sampled: 9/18/96	Sampled: 9/18/96	Sampled: 9/18/96	Sampled: 9/19/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
400	Acenaphthene	-	-	-	-	-	-
2000	Anthracene	-	-	-	-	-	-
30	Bis(2-ethylhexyl)phthalate	-	-	-	-	-	-
---	Dibenzofuran	-	-	-	-	-	-
900	Di-n-butylphthalate	-	-	-	-	-	-
600	1,2-Dichlorobenzene	-	-	-	-	-	-
100	2,4-Dimethylphenol	-	-	-	-	-	-
300	Fluoranthene	-	-	-	-	-	-
300	Fluorene	-	-	-	-	-	-
---	2-Methylphenol	-	-	-	-	-	-
---	4-Methylphenol	-	-	-	-	-	-
---	2-Methylnaphthalene	-	-	-	-	-	-
---	Napthalene	-	-	-	-	-	-
---	Phenanthrene	-	-	-	-	-	-
4000	Phenol	-	-	-	-	-	-
200	Pyrene	-	-	-	-	-	-

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

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Indicates exceedance of the New Jersey Groundwater Quality Standard for a Class IIa aquifer.

"-" indicates that the constituent was not detected as qualified by a "U" or "UJ".

TABLE 4
SUMMARY OF CHEMICAL ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
ORGANIC DETECTIONS - SEMIVOLATILES

STANDARD (1)	PARAMETER	MW-10D	MW-10R	MW-11D	MW-11R	MW-12D	RMW-13D
		Sampled: 9/20/96	Sampled: 9/20/96	Sampled: 9/24/96	Sampled: 9/24/96	Sampled: 9/23/96	Sampled: 9/23/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
400	Acenaphthene	-	-	-	-	-	-
2000	Anthracene	-	-	-	-	-	-
30	Bis(2-ethylhexyl)phthalate	-	-	16	-	-	-
---	Dibenzofuran	-	-	-	-	-	-
900	Di-n-butylphthalate	-	-	1	-	-	-
600	1,2-Dichlorobenzene	-	-	7	-	-	-
100	2,4-Dimethylphenol	-	-	4	-	-	-
300	Fluoranthene	-	-	-	-	-	-
300	Fluorene	-	-	-	-	-	-
---	2-Methylphenol	-	-	17	-	-	-
---	4-Methylphenol	-	-	18	-	-	-
---	2-Methylnapthalene	-	-	5	-	-	-
---	Napthalene	-	-	8	-	-	-
---	Phenanthrene	-	-	1	-	-	-
4000	Phenol	-	-	-	19	-	-
200	Pyrene	-	-	-	-	-	-

Notes:

Units are in ug/l.

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TABLE 4
SUMMARY OF CHEMICAL ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
ORGANIC DETECTIONS - SEMIVOLATILES

STANDARD (1)	PARAMETER	MW-14D Sampled: 9/23/96	MW-14R Sampled: 9/23/96	MW-14R (Dup.) Sampled: 9/23/96	MW-15D Sampled: 9/24/96	MW-16D Sampled: 9/23/96	MW-17D Sampled: 9/19/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
400	Acenaphthene	-	-	-	-	-	-
2000	Anthracene	-	-	-	-	-	-
30	Bis(2-ethylhexyl)phthalate	-	-	-	-	1	-
---	Dibenzofuran	-	-	-	-	-	-
900	Di-n-butylphthalate	-	-	-	-	-	-
600	1,2-Dichlorobenzene	-	-	-	-	-	-
100	2,4-Dimethylphenol	-	-	-	-	-	-
300	Fluoranthene	-	-	-	-	-	-
300	Fluorene	-	-	-	-	-	-
---	2-Methylphenol	-	-	-	-	-	-
---	4-Methylphenol	-	-	-	-	-	-
---	2-Methylnapthalene	-	-	-	-	-	-
---	Napthalene	-	-	-	-	-	-
---	Phenanthrene	-	-	-	-	-	-
4000	Phenol	-	-	-	-	-	-
200	Pyrene	-	1	-	-	-	-

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

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TABLE 4
SUMMARY OF CHEMICAL ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
ORGANIC DETECTIONS - SEMIVOLATILES

STANDARD (1)	PARAMETER	MW-18D	MW-18D (Dup.)	PW-01	RESULT	RESULT	RESULT
		Sampled: 9/19/96	Sampled: 9/19/96	Sampled: 9/23/96			
		RESULT	RESULT	RESULT			
400	Acenaphthene	-	-	-			
2000	Anthracene	-	-	-			
30	Bis(2-ethylhexyl)phthalate	-	-	-			
---	Dibenzofuran	-	-	-			
900	Di-n-butylphthalate	-	-	-			
600	1,2-Dichlorobenzene	-	-	-			
100	2,4-Dimethylphenol	-	-	-			
300	Fluoranthene	-	-	-			
300	Fluorene	-	-	-			
---	2-Methylphenol	-	-	-			
---	4-Methylphenol	-	-	-			
---	2-Methylnaphthalene	-	-	-			
---	Naphthalene	-	-	-			
---	Phenanthrene	-	-	-			
4000	Phenol	-	-	-			
200	Pyrene	-	-	-			

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

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TABLE 4
SUMMARY OF CHEMICAL ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
PESTICIDE/PCB DETECTIONS

STANDARD (1)	PARAMETER	MW-2D	MW-2R	MW-5D	MW-7D	MW-8D	MW-8R
		Sampled:9/17/96	Sampled:9/18/96	Sampled:9/18/96	Sampled:9/18/96	Sampled:9/18/96	Sampled:9/19/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
0.04	Aldrin	-	-	-	-	-	-
0.2	beta-BHC	-	-	-	-	-	-
0.5	alpha-Chlordane	-	-	-	-	-	-
0.5	gamma-Chlordane	-	-	-	-	-	-
0.1	4,4-DDE	-	-	-	-	-	-
0.1	4,4-DDT	-	-	-	0.0064	-	-
0.03	Dieldrin	-	-	-	-	-	-
0.4	Endosulfan II	-	-	-	-	-	-
—	Endrin Aldehyde	-	-	-	-	-	-
0.4	Heptachlor	-	-	-	-	-	-
0.5	Aroclor-1242	-	-	-	-	-	-

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

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TABLE 4
SUMMARY OF CHEMICAL ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
PESTICIDE/PCB DETECTIONS

STANDARD (1)	PARAMETER	MW-10D	MW-10R	MW-11D	MW-11R	MW-12D	RMW-13D
		Sampled: 9/20/96	Sampled: 9/20/96	Sampled: 9/24/96	Sampled: 9/24/96	Sampled: 9/23/96	Sampled: 9/23/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
0.04	Aldrin	-	-	-	-	-	-
0.2	beta-BHC	-	-	-	-	-	-
0.5	alpha-Chlordane	-	-	0.017	-	-	-
0.5	gamma-Chlordane	-	-	-	-	-	-
0.1	4,4-DDE	-	-	-	-	-	-
0.1	4,4-DDT	-	-	-	-	-	-
0.03	Dieldrin	-	-	0.021	-	-	-
0.4	Endosulfan II	-	-	-	-	-	-
—	Endrin Aldehyde	-	-	-	-	-	-
0.4	Heptachlor	-	-	-	-	-	-
0.5	Aroclor-1242	-	-	14	-	-	-

Notes:

Units are in ug/l.

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TABLE 4
SUMMARY OF CHEMICAL ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
PESTICIDE/PCB DETECTIONS

STANDARD (1)	PARAMETER	MW-14D	MW-14R	MW-14R (Dup.)	MW-15D	MW-16D	MW-17D
		Sampled:9/23/96	Sampled:9/23/96	Sampled:9/23/96	Sampled:9/24/96	Sampled:9/23/96	Sampled:9/19/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
0.04	Aldrin	-	-	-	-	-	-
0.2	beta-BHC	-	-	-	-	-	-
0.5	alpha-Chlordane	-	-	-	-	-	-
0.5	gamma-Chlordane	-	-	-	-	-	-
0.1	4,4-DDE	-	-	-	0.1	-	-
0.1	4,4-DDT	-	-	-	-	-	-
0.03	Dieldrin	-	-	-	-	-	-
0.4	Endosulfan II	-	-	-	0.1	-	-
—	Endrin Aldehyde	-	-	-	0.013	-	-
0.4	Heptachlor	-	-	-	-	-	-
0.5	Aroclor-1242	-	-	-	-	-	-

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

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GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
PESTICIDE/PCB DETECTIONS

STANDARD (1)	PARAMETER	MW-18D Sampled: 9/19/96	MW-18D (Dup.) Sampled: 9/19/96	PW-01 Sampled: 9/23/96			
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
0.04	Aldrin	-	-	-			
0.2	beta-BHC	-	-	-			
0.5	alpha-Chlordane	-	-	-			
0.5	gamma-Chlordane	-	-	-			
0.1	4,4-DDE	-	-	-			
0.1	4,4-DDT	-	-	-			
0.03	Dieldrin	-	-	-			
0.4	Endosulfan II	-	-	-			
—	Endrin Aldehyde	-	-	-			
0.4	Heptachlor	-	-	-			
0.5	Aroclor-1242	-	-	-			

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

"—" indicates that no standard is available.

Indicates exceedance of the New Jersey Groundwater Quality Standard for a Class IIa aquifer.

"-." indicates that the constituent was not detected as qualified by a "U", "UJ", or "R".

TABLE 4
SUMMARY OF CHEMISTRY ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
INORGANIC DETECTIONS - TOTAL METALS/CYANIDE

STANDARD (1)	PARAMETER	MW-2D Sampled: 9/17/96	MW-2R Sampled: 9/18/96	MW-5D Sampled: 9/18/96	MW-7D Sampled: 9/18/96	MW-8D Sampled: 9/18/96	MW-8R Sampled: 9/19/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
200	Aluminum, Total	159	91.9	77	112	3540	174
20	Antimony, Total	-	2.3	-	-	-	-
8	Arsenic, Total	2.4	-	2.6	-	5	-
2000	Barium, Total	54.2	84.5	25.4	16.2	55.5	73.4
20	Beryllium, Total	-	-	-	-	0.17	-
4	Cadmium, Total	-	-	-	-	0.16	-
---	Calcium, Total	383000	355000	262000	104000	218000	308000
100	Chromium, Total	-	-	33.2	7.9	14.6	163
---	Cobalt, Total	-	0.79	-	1	2.1	0.57
1000	Copper, Total	3.5	3.7	3.9	3.9	8.9	10.7
300	Iron, Total	150	-	180	96.9	4280	114
10	Lead, Total	-	-	-	1.6	3.7	-
---	Magnesium, Total	23400	4310	16800	12100	30600	14700
50	Manganese, Total	109	3	104	74.5	278	6.6
2	Mercury, Total	-	-	-	-	-	-
100	Nickel, Total	4	4.9	15.5	20.2	16.8	15.7
---	Potassium, Total	14500	6650	1940	2290	5920	38800
50	Selenium, Total	-	-	-	-	-	-
---	Silver, Total	-	-	-	-	-	-
50000	Sodium, Total	120000	80400	61700	52700	186000	144000
10	Thallium	-	-	-	-	-	-
---	Vanadium, Total	4.5	4.7	3.6	8	6.5	4.2
5000	Zinc, Total	24	17.4	31.6	30.1	27.9	21.8
200	Cyanide	-	-	-	-	-	-

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

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TABLE 4
SUMMARY OF CHEMISTRY ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
INORGANIC DETECTIONS - TOTAL METALS/CYANIDE

STANDARD (1)	PARAMETER	MW-10D Sampled:9/20/96	MW-10R Sampled:9/20/96	MW-11D Sampled:9/24/96	MW-11R Sampled:9/24/96	MW-12D Sampled:9/23/96	RMW-13D Sampled:9/23/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
200	Aluminum, Total	193	348	632	361	395	128
20	Antimony, Total	3.5	-	-	-	-	-
8	Arsenic, Total	2.6	-	-	-	-	3.2
2000	Barium, Total	40.9	25.7	31.4	34.3	78.2	45.4
20	Beryllium, Total	-	-	-	-	-	-
4	Cadmium, Total	0.31	0.3	-	-	0.3	-
---	Calcium, Total	88300	91900	148000	120000	176000	179000
100	Chromium, Total	373	5.3	4.1	14	3.4	1.7
---	Cobalt, Total	0.54	-	0.61	-	-	-
1000	Copper, Total	8.6	4.5	5.4	10.4	15.5	3.6
300	Iron, Total	162	354	650	362	609	53.5
10	Lead, Total	1.7	-	2.8	2.5	1.7	-
---	Magnesium, Total	527	4170	5620	119	36900	12900
50	Manganese, Total	4.3	14.9	41.8	3.7	817	24.5
2	Mercury, Total	-	-	-	-	-	-
100	Nickel, Total	13	6	6	4.3	4.9	3.5
---	Potassium, Total	41100	3840	2510	10100	2410	5130
50	Selenium, Total	-	-	-	-	-	-
---	Silver, Total	-	-	-	-	-	-
50000	Sodium, Total	82100	36700	63600	46300	179000	86900
10	Thallium	-	-	-	-	-	-
---	Vanadium, Total	48.1	28.3	6.4	62.8	0.9	1.6
5000	Zinc, Total	16.7	24.1	-	-	33.4	-
200	Cyanide	-	-	-	-	-	-

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

"---" indicates that no standard is available.

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"-" indicates that the constituent was not detected qualified by a "U", "UJ", or "R".

TABLE 4
SUMMARY OF CHEMISTRY ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
INORGANIC DETECTIONS - TOTAL METALS/CYANIDE

STANDARD (1)	PARAMETER	MW-14D Sampled:9/23/96	MW-14R Sampled:9/23/96	MW-14R (Dup.) Sampled:9/23/96	MW-15D Sampled:9/24/96	MW-16D Sampled:9/23/96	MW-17D Sampled:9/19/96
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
200	Aluminum, Total	544	167	173	389	246	531
20	Antimony, Total	-	-	-	-	-	-
8	Arsenic, Total	8	3	2.6	-	-	-
2000	Barium, Total	61.4	16	16.7	108	184	64.6
20	Beryllium, Total	-	-	-	-	-	-
4	Cadmium, Total	0.48	-	0.34	-	-	0.34
---	Calcium, Total	103000	170000	168000	123000	224000	254000
100	Chromium, Total	434	4	3.9	42	2.1	6.1
---	Cobalt, Total	0.58	-	-	-	-	1.7
1000	Copper, Total	22.1	3.3	4.3	8.9	5.8	4.7
300	Iron, Total	135	1320	1310	290	41.9	945
10	Lead, Total	-	-	1.9	3.2	1.9	-
---	Magnesium, Total	150	9760	9300	1270	4570	57300
50	Manganese, Total	2.9	36.8	35.3	6.5	3.1	1360
2	Mercury, Total	-	-	-	-	-	-
100	Nickel, Total	9	3.6	5.9	18.9	4.4	41.5
---	Potassium, Total	101000	2520	2500	14800	12100	7640
50	Selenium, Total	4.1	-	-	-	-	-
---	Silver, Total	-	-	-	-	-	-
50000	Sodium, Total	120000	36000	35400	55900	93100	244000
10	Thallium	-	-	-	-	-	-
---	Vanadium, Total	87.3	9.8	9.6	21.7	10	1.9
5000	Zinc, Total	-	-	73.9	-	-	13.7
200	Cyanide	10.9	-	-	-	-	-

Notes:

Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards"(GWQS), April 5th, 1994 edition.

"---" indicates that no standard is available.

Indicates exceedance of the New Jersey Groundwater Quality Standard for a Class IIa aquifer.

"-" indicates that the constituent was not detected qualified by a "U", "UJ", or "R".

TABLE 4
SUMMARY OF CHEMISTRY ANALYSIS DETECTIONS
GROUNDWATER SAMPLES
216 PATERSON PLANK ROAD SITE
INORGANIC DETECTIONS - TOTAL METALS/CYANIDE

STANDARD (1)	PARAMETER	MW-18D Sampled: 9/19/96	MW-18D (Dup.) Sampled: 9/19/96	PW-01 Sampled: 9/23/96			
		RESULT	RESULT	RESULT	RESULT	RESULT	RESULT
200	Aluminum, Total	203	219	238			
20	Antimony, Total	-	-	-			
8	Arsenic, Total	-	-	-			
2000	Barium, Total	35.4	35.1	68.2			
20	Beryllium, Total	-	-	-			
4	Cadmium, Total	-	-	-			
---	Calcium, Total	297000	296000	35100			
100	Chromium, Total	3.2	2.5	-			
---	Cobalt, Total	0.9	1.0	-			
1000	Copper, Total	6.3	6.1	21.6			
300	Iron, Total	138	128	27			
10	Lead, Total	-	1.9	1.9			
---	Magnesium, Total	48500	48500	6770			
50	Manganese, Total	318	319	7.7			
2	Mercury, Total	-	-	-			
100	Nickel, Total	29.4	30.6	3			
---	Potassium, Total	5690	5690	1970			
50	Selenium, Total	-	-	-			
---	Silver, Total	-	-	-			
50000	Sodium, Total	199000	199000	37000			
10	Thallium	-	-	-			
---	Vanadium, Total	4.8	4.7	0.93			
5000	Zinc, Total	18.4	31.8	-			
200	Cyanide	-	-	-			

Notes:

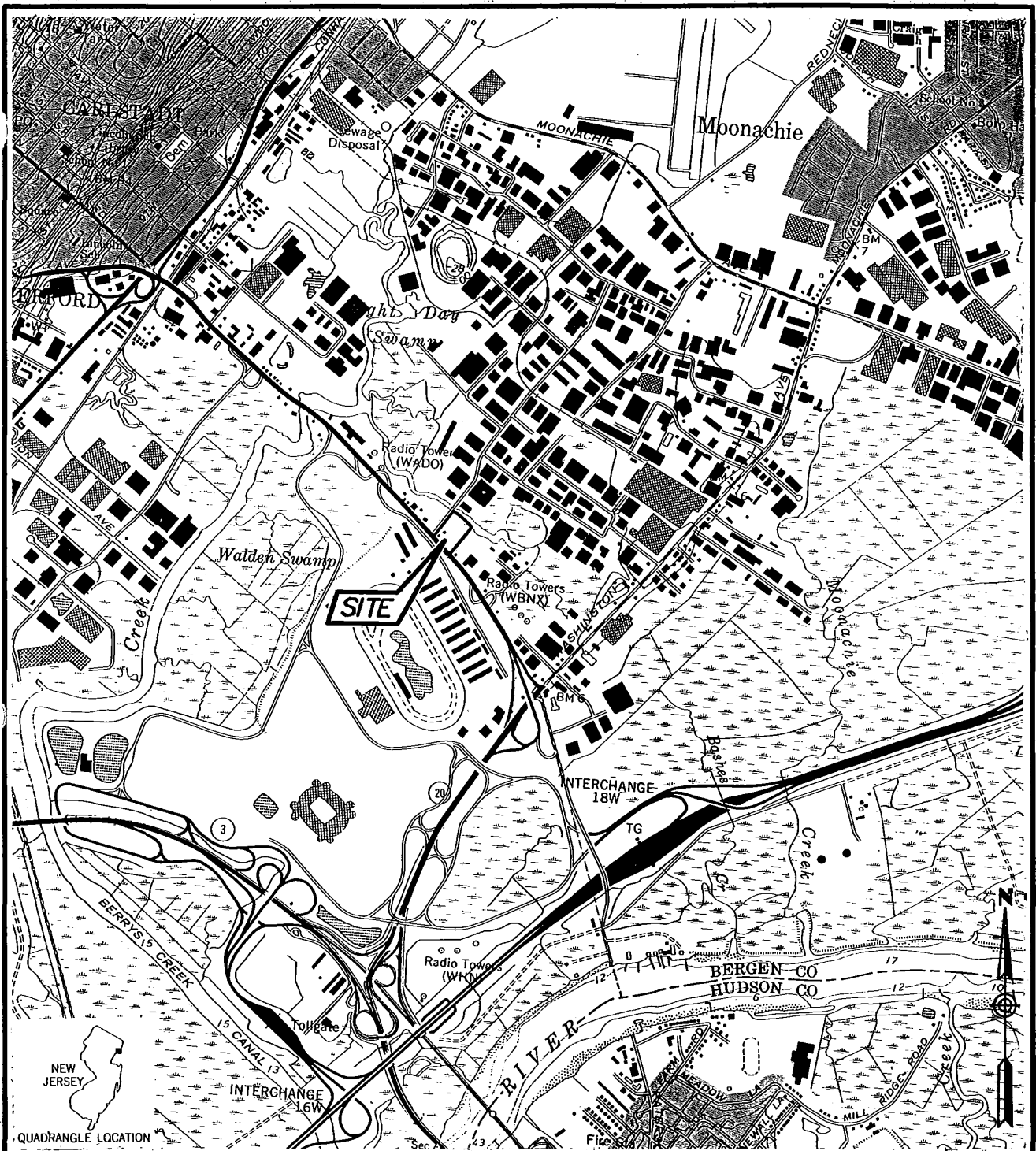
Units are in ug/l.

(1) - The standard column is derived from the "New Jersey Register" N.J.A.C. 7:9-6 "Groundwater Quality Standards" (GWQS), April 5th, 1994 edition.

"---" indicates that no standard is available.

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"-" indicates that the constituent was not detected qualified by a "U", "UJ", or "R".



REFERENCE

- 1.) USGS 7.5 MINUTE WEEHAWKEN QUADRANGLE, NEW JERSEY - NEW YORK, DATE 1967, PHOTOREVISED 1981.

2000 JAN 2 10 1997 2000
 scale feet

JOB No.:	943-6222	SCALE:	AS SHOWN
DR BY:	WCM	DATE:	02/21/96
CHK BY:	SDM	FILE No.:	NJ03-438
REV BY:	PL	DR SUBTITLE:	09

SITE LOCATION MAP

Golder Associates

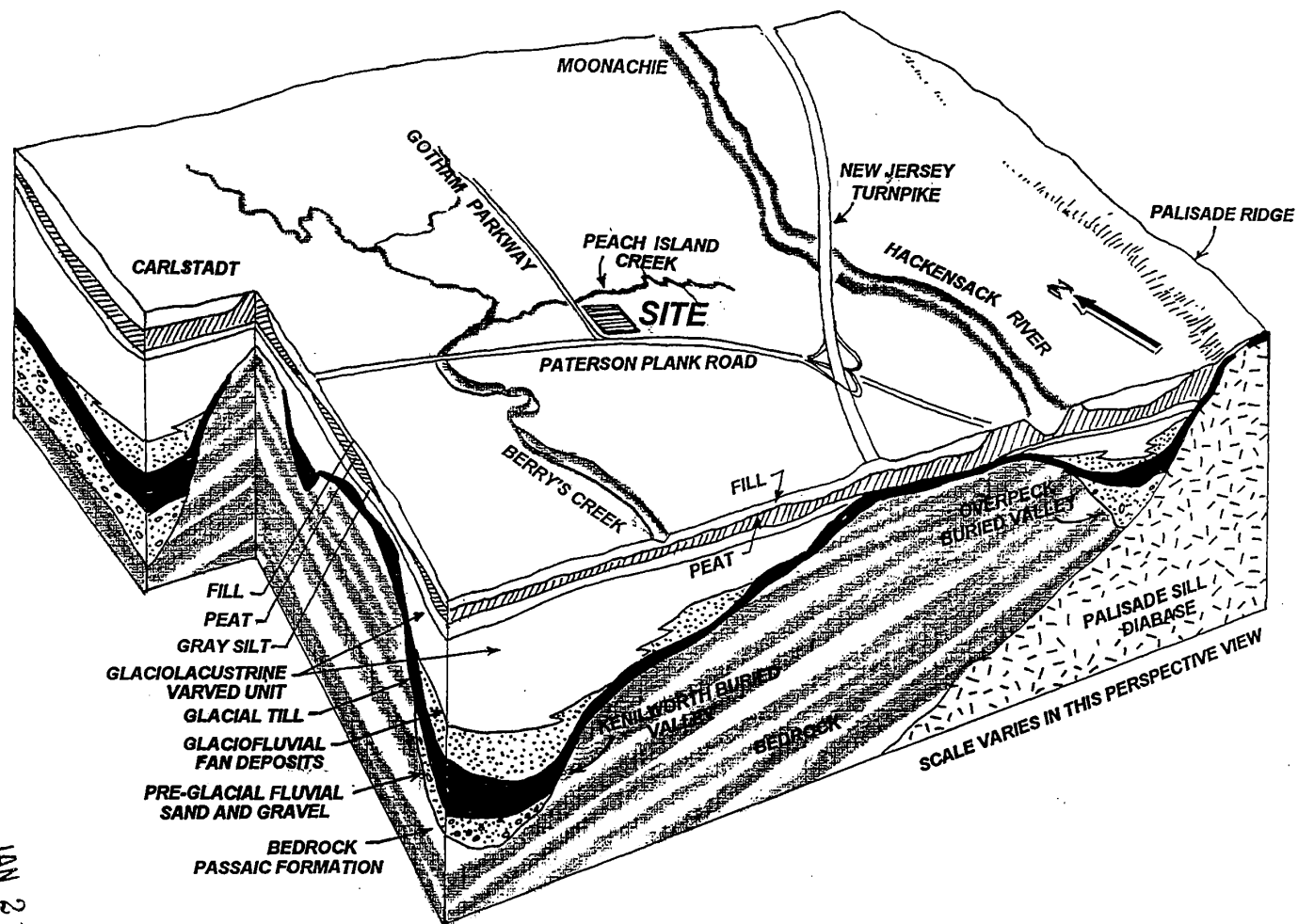
216 PATERSON PLANK ROAD SITE

FIGURE

1

R2-0000333

JOB No:	943-6222	SCALE:	N.T.S.
DR BY:	RV	DATE:	01/21/97
CHK BY:	SDM	FILE No:	NJ03-627
REV BY:	RV	OR SUBMIT:	11
Golder Associates		REGIONAL GEOLOGY	
216 PATERSON PLANK ROAD SITE		FIGURE	
		3	



JAN 21 1997

STRATIGRAPHIC UNITS

FILL: variable thickness; including asphalt, silt, sand, gravel, concrete, brick, timber etc.; highly variable SPT blow counts

PEAT: laterally persistent and correlatable meadow mat unit, locally removed during site activities, variable thickness, dark brown to gray color, organic silt, clay and sand, fibres common, low SPT blow counts, grades down into Gray Silt.

GRAY SILT: uniform thickness, intertidal unit, mottled dark gray to brownish gray color, with silt and fine sand seams, bedded to laminated; upper contact grades into peat, lower contact grades into the uppermost glacial sediments; SPT blow counts variable but generally N=5 or higher.

GLACIOLACUSTRINE VARVED UNIT: stratified glacial deposits; upper horizon sandier and varved with local zones of fine silt and sand, set in a stiff to very stiff matrix of silty clay and clay, variegated color ranging from brownish gray, dark gray, to brownish red. Lower horizon consists of deep red, reddish brown and locally brick red, high plasticity, massive clay; varved structure apparent when dry but clastic content much lower than upper horizon. SPT blow counts in upper horizon generally higher than N=5; lower horizon is commonly N=0 or weight of hammer; local sandier zones present near lower geologic contact with underlying unit. Both horizons tentatively correlated with the Glacial Lake Hackensack and Glacial Lake Bayonne sediments, upper horizon possibly desiccated.

GLACIAL TILL: two unstratified basal horizons recognized, characteristically red to reddish brown, brick red and locally dark brown in color; upper horizon is softer somewhat weathered less dense, glacial till, SPT blow counts generally less than N=25, soft sandy to silty glacial till with matrix supported clasts which include metamorphic rock fragments; lower horizon, a lodgement till, consists of very hard, SPT blow counts ranging from N=50 to N=200, dominated by in-situ rock fragments including siltstone and shale, and sandstone of local bedrock; the upper geologic contact with varved unit is sharp, and marked by distinct change in geotechnical character; lower geologic contact grades imperceptibly into bedrock; This unit correlatable with the Rahway Till.

BEDROCK: bedrock consists of brick red and brown, and red, speckled and mottled by green reduction haloes and spots, horizontally bedded, laminated and fissile shale, siltstone and fine sandstone of the Passaic Formation. The basal lodgement till of overlying unconsolidated deposits grades into the bedrock. Bedrock includes several carbonate-bearing horizons; carbonate occurs as vugs, nodules; fracture and bedding-planes sometimes infilled and coated with calcite and/or dolomite.

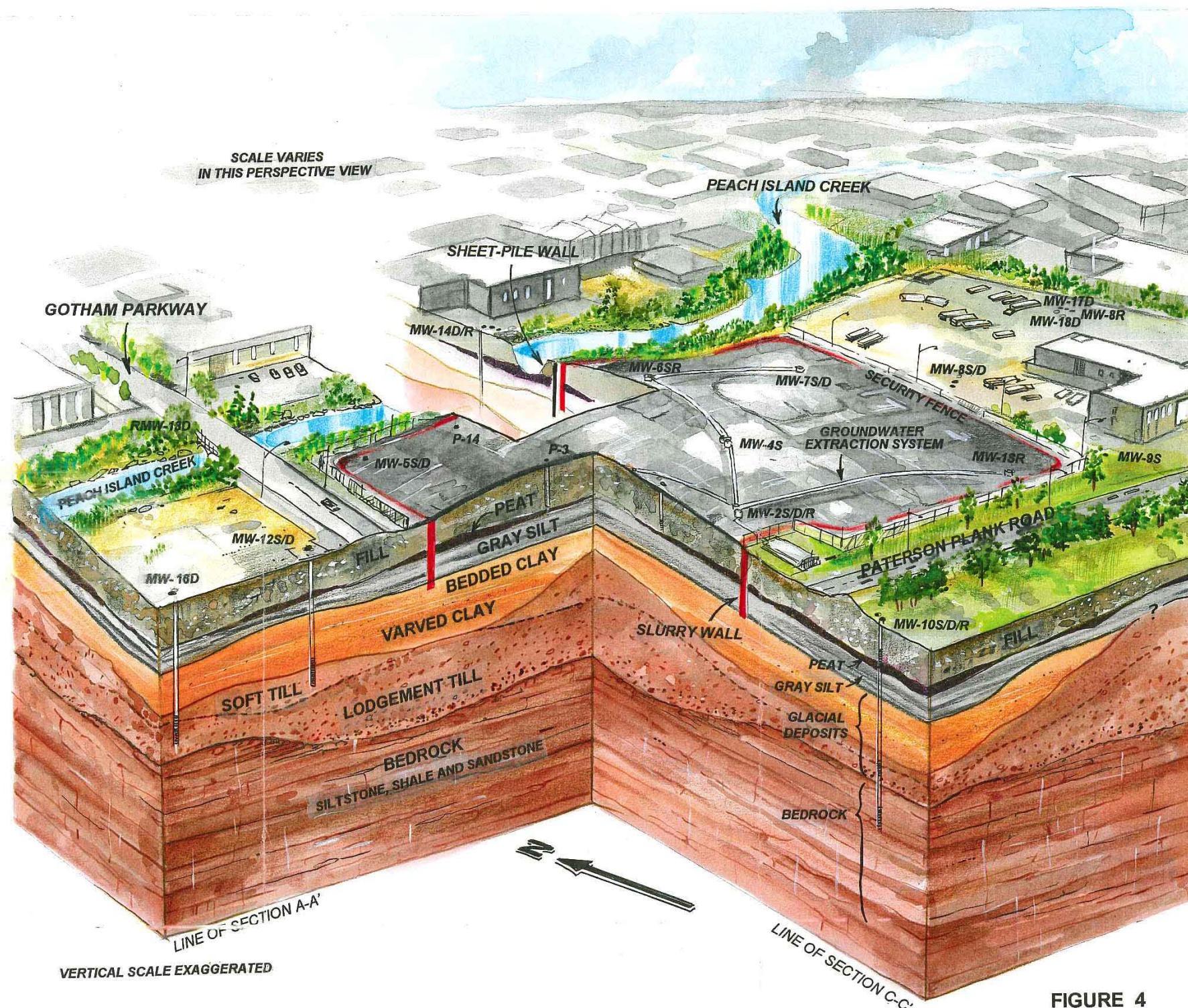
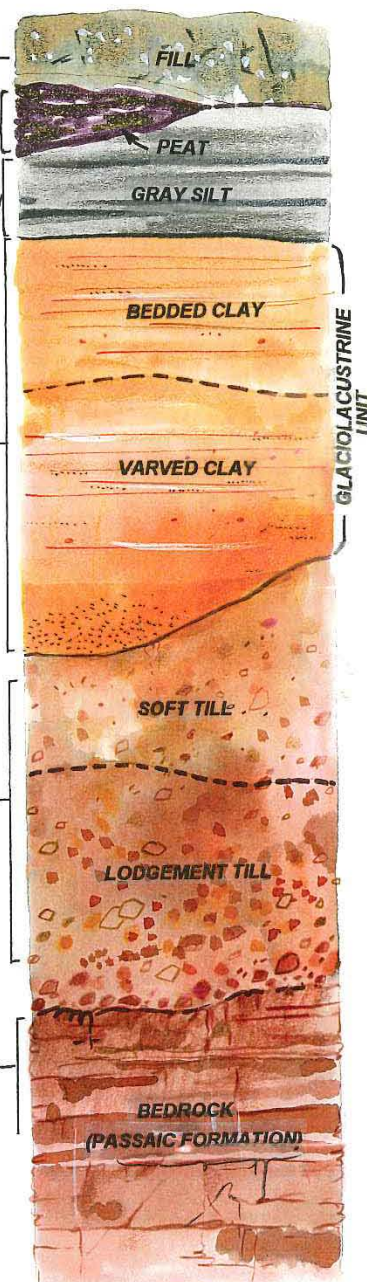
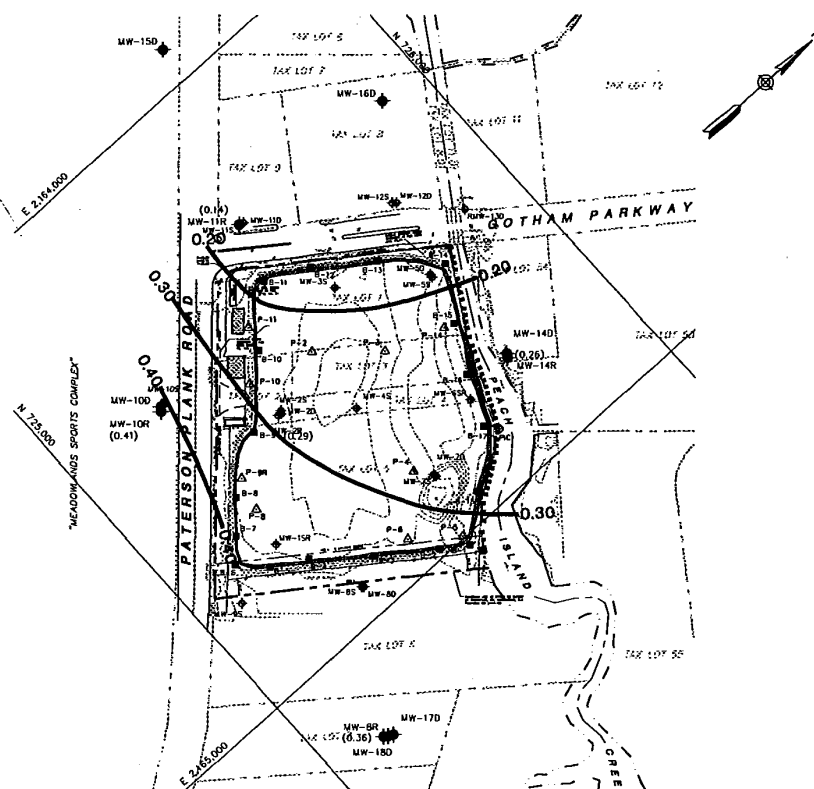
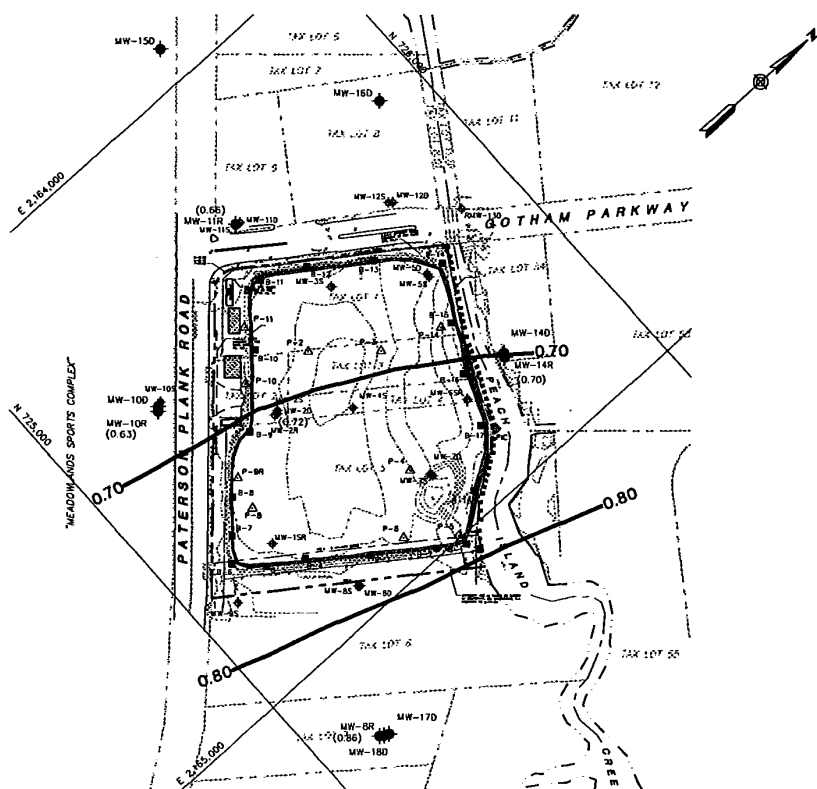
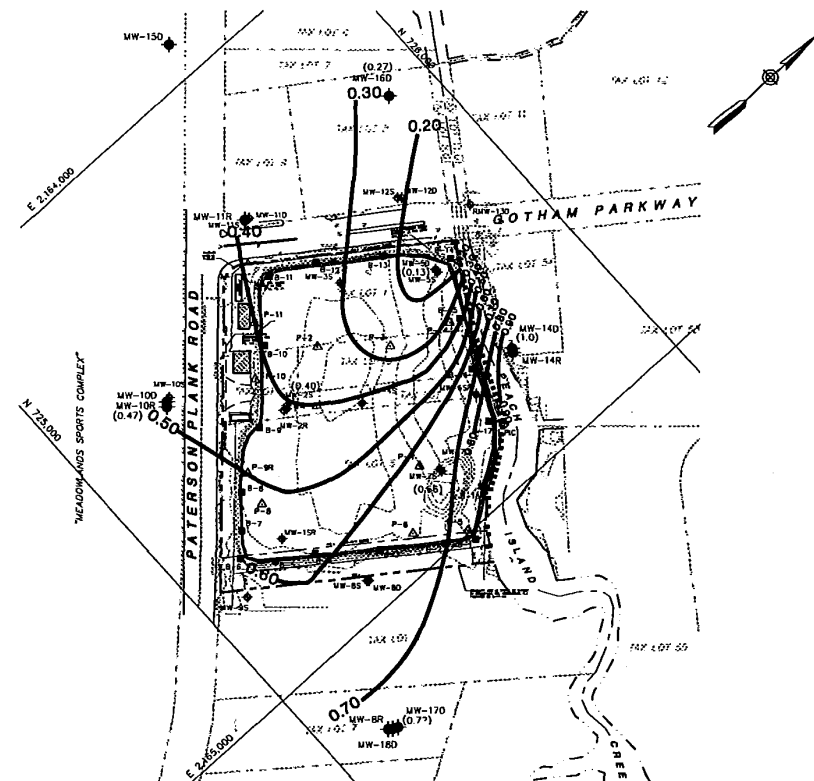
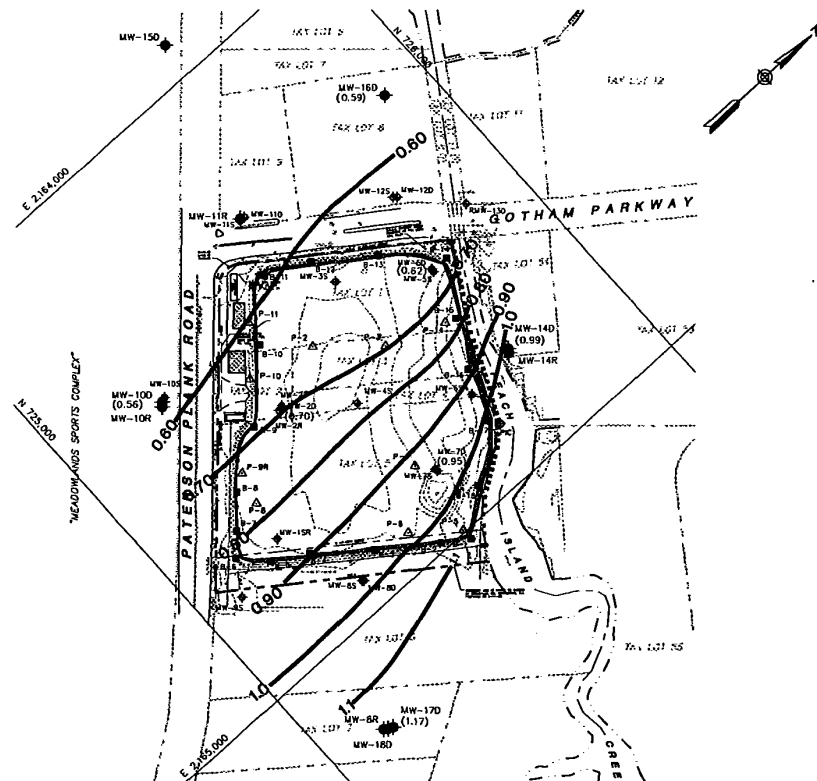










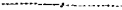






FIGURE 4

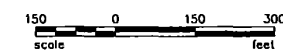
CONCEPTUAL BLOCK DIAGRAM
216 PATERSON PLANK ROAD SITE

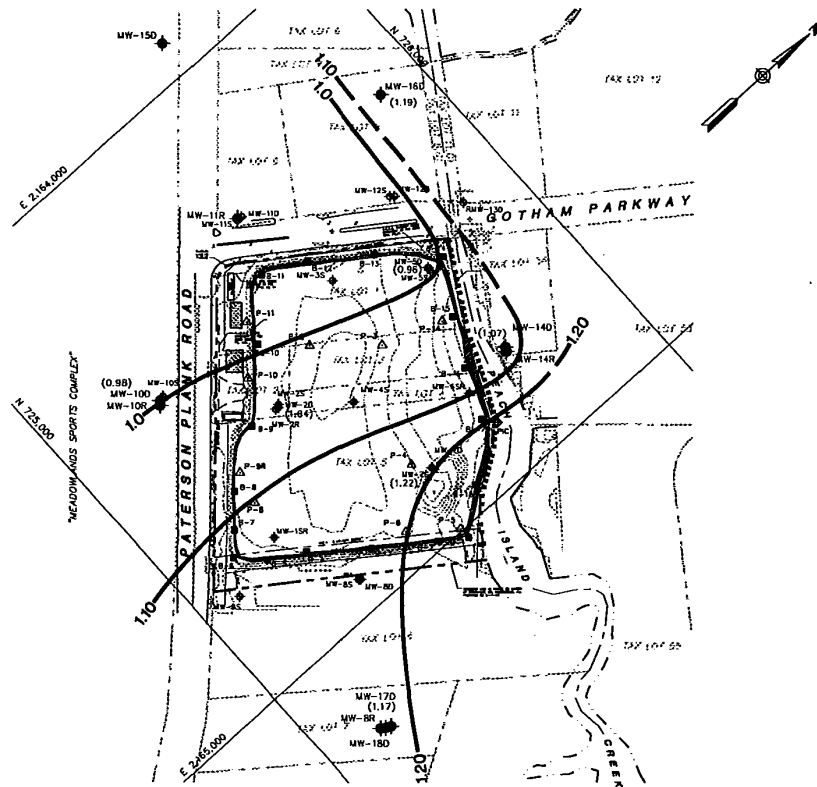




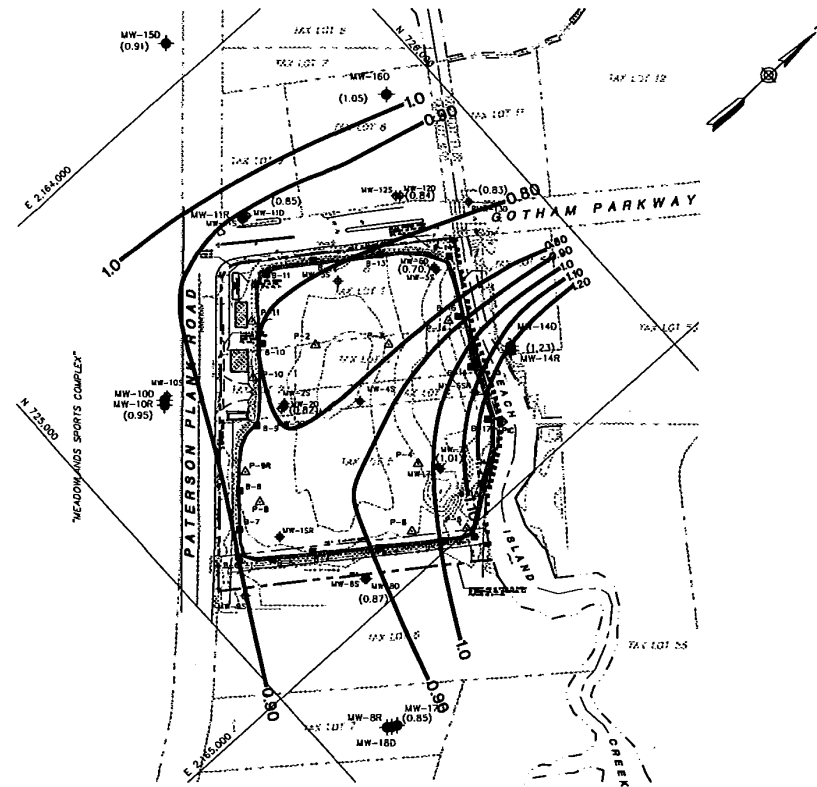
- | | |
|--|---|
| LEGEND | |
| MW-80  | EXISTING MONITORING WELL
(INSTALLED DURING THE REMEDIAL INVESTIGATION) |
| MW-180  | NEW MONITORING WELL
(INSTALLED DURING THE OFF-PROPERTY INVESTIGATION) |
| P-4  | SHALLOW PIEZOMETER
(INSTALLED DURING THE REMEDIAL INVESTIGATION) |
| EW-15  | EXTRACTION WELL
(INSTALLED DURING THE REMEDIAL INVESTIGATION AND
RETROFITTED FOR SHALLOW GROUNDWATER EXTRACTION AS
PART OF THE IRM CONSTRUCTION) |
| B-6  | SLURRY WALL CONSTRUCTION INVESTIGATION BORING
(INSTALLED DURING REMEDIAL DESIGN) |
| PC  | STILLING WALL
(INSTALLED DURING OFF-SITE PROPERTY INVESTIGATION) |
| (0.72) | WATER ELEVATION (FT-MSL) |
| 0.80  | INTERPRETED GROUNDWATER CONTOUR (FT-MSL) |
|  | SITE PROPERTY-BOUNDARY |
|  | PROPERTY/RIGHT-OF-WAY BOUNDARIES |
|  | CONTOUR LINE |
|  | STREAM |
|  | FENCE |
|  | UTILITY POLE |
|  | SLURRY WALL ALIGNMENT |
|  | SHEET PILE WALL
ALIGNMENT |

- ## NOTES
-
- 1.) COORDINATE SYSTEM SHOWN IS NEW JERSEY STATE PLANE NAD27 AND VERTICAL DATUM BASED ON NAVD 1929.
 - 2.) LOCATION OF SLURRY WALL INVESTIGATION BORINGS ARE APPROXIMATE. BORING LOCATIONS WERE PREVIOUSLY SURVEYED USING A SITE SPECIFIC COORDINATE SYSTEM.
 - 3.) FT-MSL - MEAN SEA LEVEL
- ## REFERENCE
-
- 1.) TOPOGRAPHIC DATA AND SURFACE FEATURES BASED ON INFORMATION BY TAYLOR, WISEMAN & TAYLOR CONSULTING ENGINEERS/SURVEYORS/PLANNERS/LANDSCAPE ARCHITECTS, MOUNT LAUREL, NEW JERSEY, DATED 06/12/92, SCALE 1"=40'.
 - 2.) LOT AND BLOCK DATA FROM LOCAL TAX MAP, BOUNDARIES APPROXIMATE.
 - 3.) MONITORING WELLS, PIEZOMETERS, AND EXTRACTION WELLS SURVEYED BY GEOCO CORPORATION, NEWFUNDLAND, NJ (OCTOBER 1996).
 - 4.) SLURRY WALL BORINGS AND FEATURES FROM THE INTERIM REMEDIAL MEASURES TAKEN FROM CANONIE ENVIRONMENTAL, 1992 "INTERIM REMEDY FOR FIRST OPERATING UNIT", AUGUST, 1992.

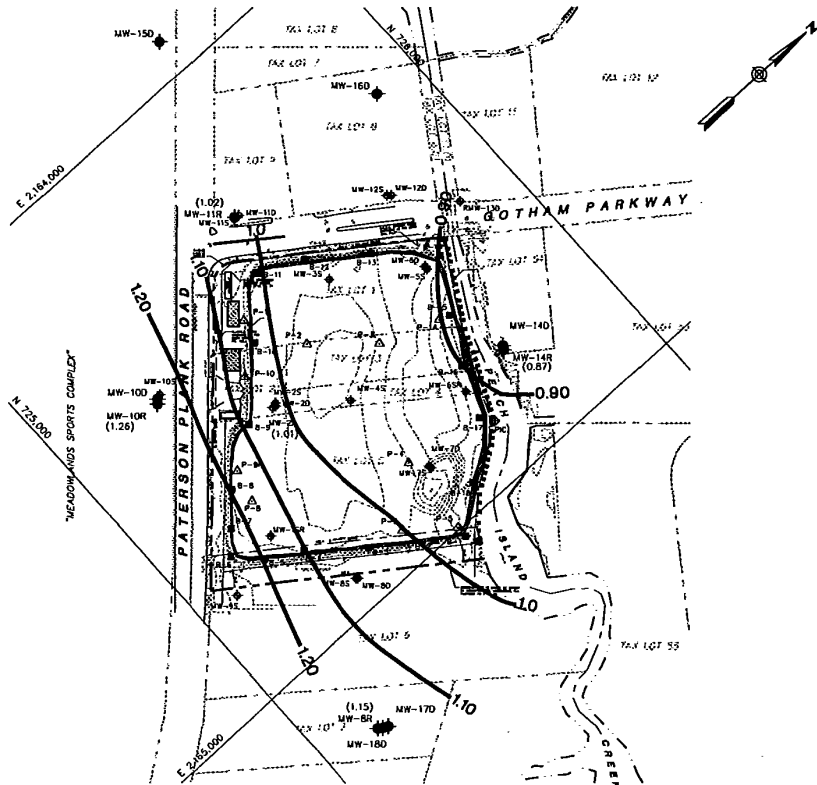
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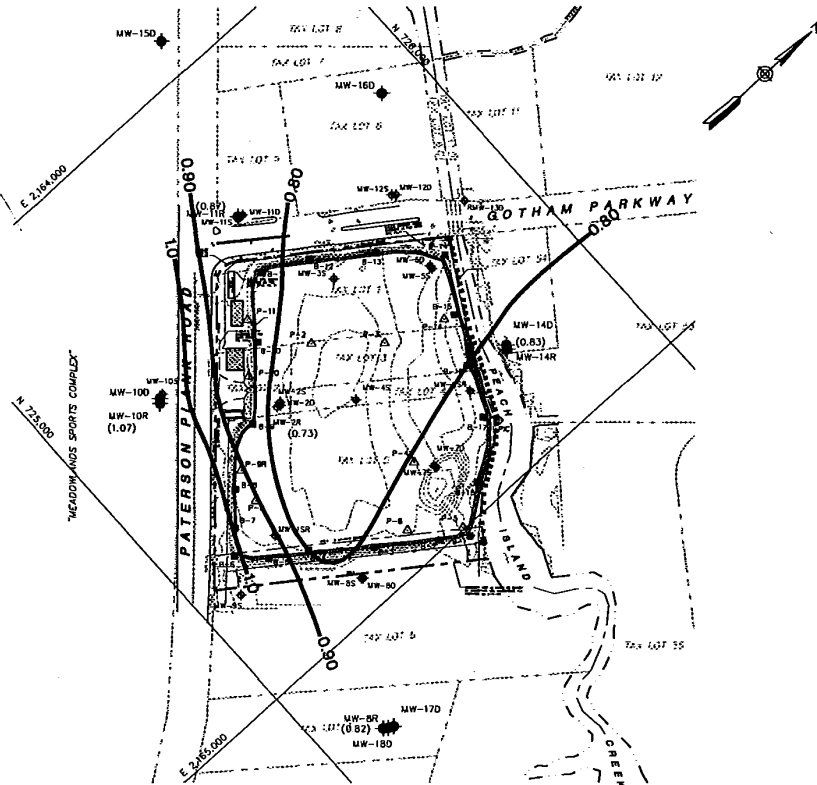
TILL UNIT
November 18, 1996 - Monday at 1900



TILL UNIT
November 22, 1996 - Friday at 0700



BEDROCK UNIT
November 18, 1996 - Monday at 1900



BEDROCK UNIT
November 22, 1996 - Friday at 0700

LEGEND

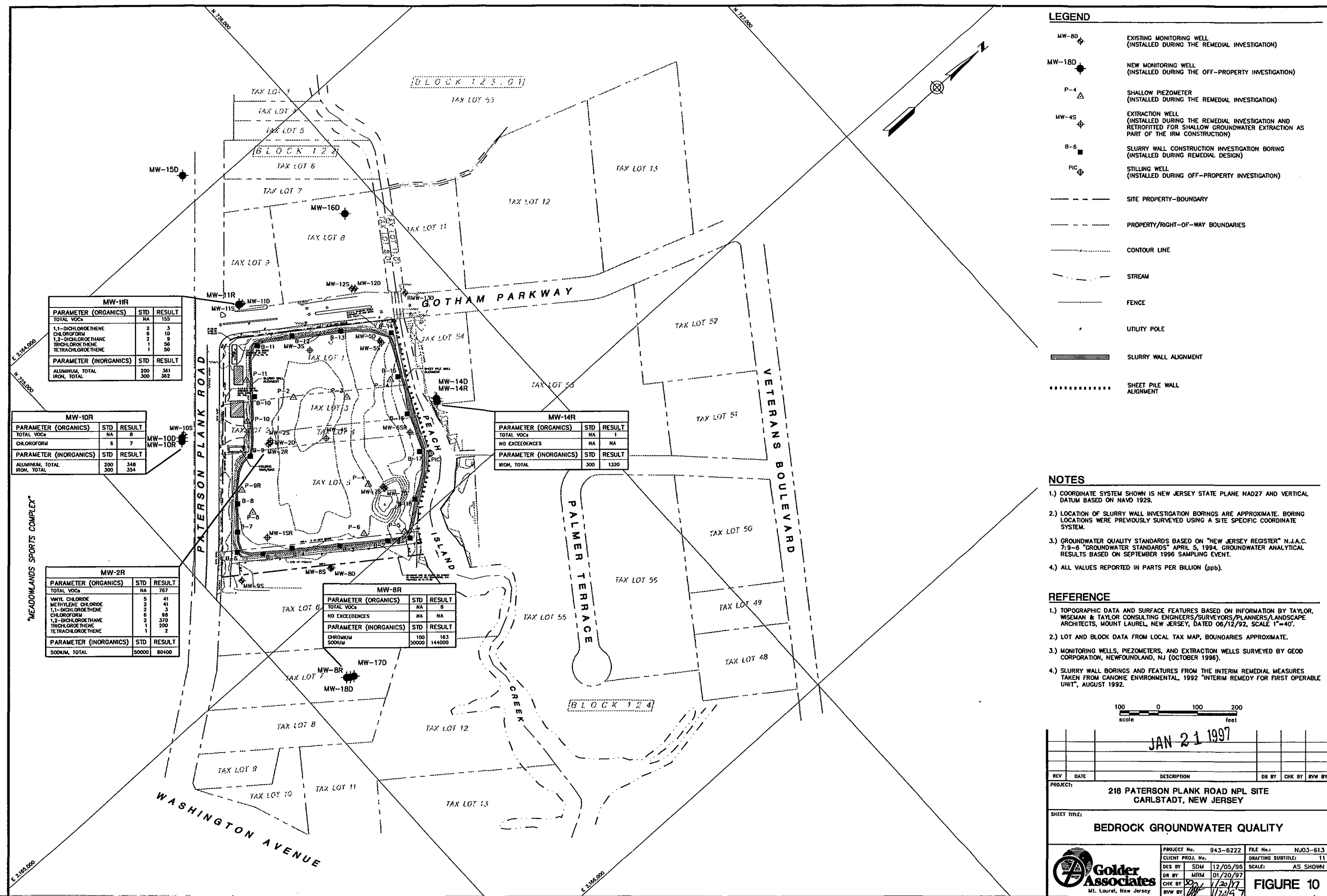
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- MW-180 NEW MONITORING WELL (INSTALLED DURING THE OFF-PROPERTY INVESTIGATION)
- P-4 SHALLOW PIEZOMETER (INSTALLED DURING THE REMEDIAL INVESTIGATION)
- MW-45 EXTRACTION WELL (INSTALLED DURING THE REMEDIAL INVESTIGATION AND RETROFITTED FOR SHALLOW GROUNDWATER EXTRACTION AS PART OF THE IRM CONSTRUCTION)
- B-5 SLURRY WALL CONSTRUCTION INVESTIGATION BORING (INSTALLED DURING REMEDIAL DESIGN)
- PG STILLING WELL (INSTALLED DURING OFF-SITE PROPERTY INVESTIGATION)
- (0.72) WATER ELEVATION (FT-MSL)
- 0.90 INTERPRETED GROUNDWATER CONTOUR (FT-MSL)
- SITE PROPERTY-BOUNDARY
- PROPERTY/RIGHT-OF-WAY BOUNDARIES
- CONTOUR LINE
- STREAM
- FENCE
- UTILITY POLE
- SLURRY WALL ALIGNMENT
- SHEET PILE WALL ALIGNMENT

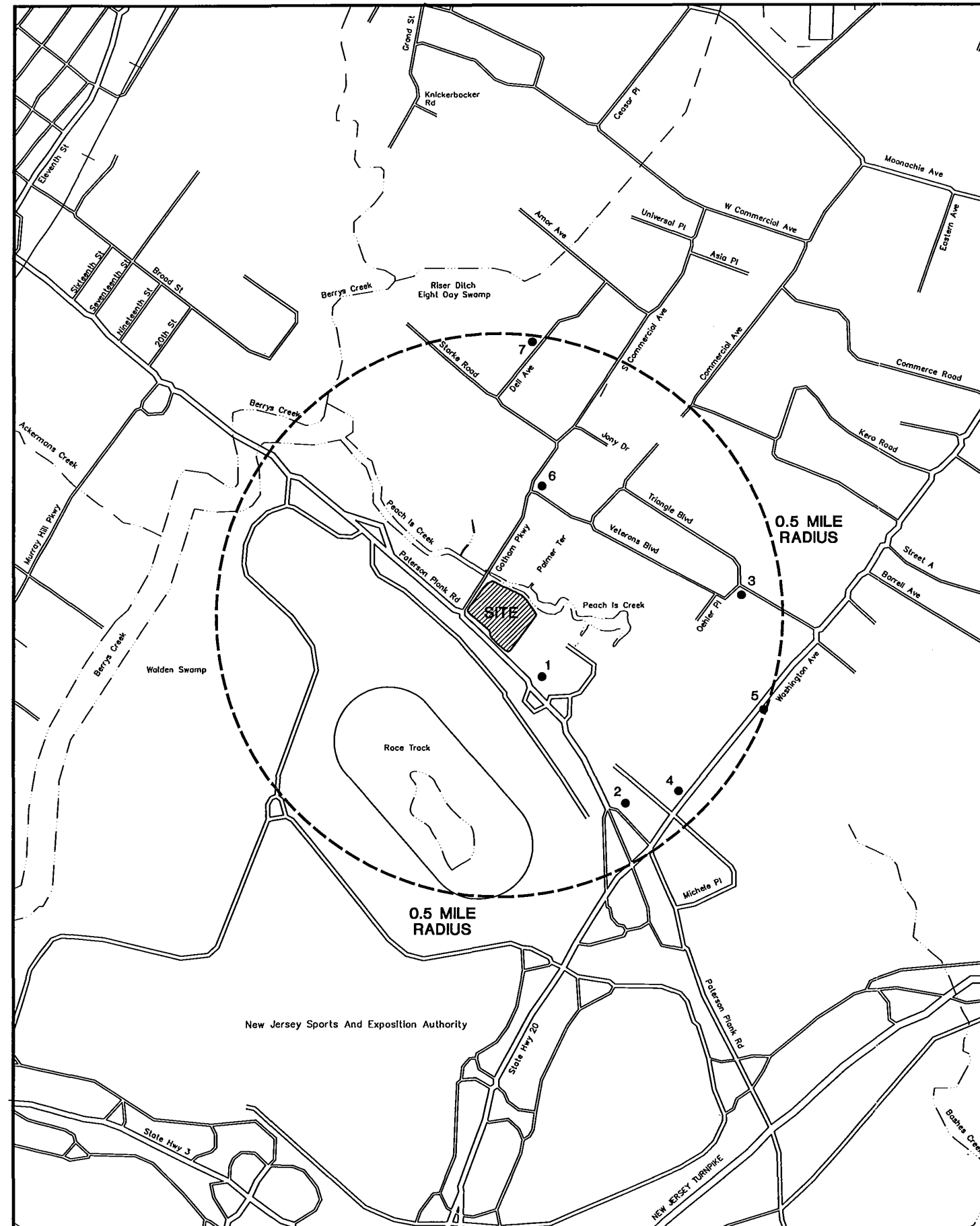
- NOTES**
- COORDINATE SYSTEM SHOWN IS NEW JERSEY STATE PLANE NAD27 AND VERTICAL DATUM BASED ON NAVD 1929.
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 - LOT AND BLOCK DATA FROM LOCAL TAX MAP, BOUNDARIES APPROXIMATE.
 - MONITORING WELLS, PIEZOMETERS, AND EXTRACTION WELLS SURVEYED BY GEOO CORPORATION, NEWFOUNDLAND, NJ (OCTOBER 1996).
 - SLURRY WALL BORINGS AND FEATURES FROM THE INTERIM REMEDIAL MEASURES TAKEN FROM CANONIE ENVIRONMENTAL, 1992 "INTERIM REMEDY FOR FIRST OPERABLE UNIT", AUGUST, 1992.



REV	DATE	DESCRIPTION	DR BY	CHK BY	RVW BY
PROJECT: 216 PATERSON PLANK ROAD NPL SITE CARLSTADT, NEW JERSEY					
SHEET TITLE: POTENTIOMETRIC SURFACE MAP TILL AND BEDROCK UNITS November 18 & 22, 1996					
PROJECT No. 943-6222		FILE No. NJ03-626			
CLIENT PROJ. No.		DRAFTING SUBTITLE: 11			
DES BY	SOM	01/06/97	SCALE: AS SHOWN		
DR BY	MRM	01/20/97			
CHK BY	SCJ	1/23/97			
RVW BY					

FIGURE 8





INDEX OF WELLS					
WELL ID No.	OWNER / LOCATION	DEPTH / UNIT	YIELD (GPM)	USE	DATE OF INSTALLATION
1	Rutherford Investment Corp., 320 Paterson Plank Road, Carlstadt	150 ft. / Bedrock	60	Cooling	12/21/72
2	Peoples Bank of South Bergen County, 192 Paterson Plank Road, Carlstadt	171 ft. / Bedrock	25	Lawns	04/21/71
3	J.E.S. Corporation, 400 Veterans Boulevard, Carlstadt	153 ft. / Bedrock	35	Industrial	07/02/81
4	Bade Brothers, 215 Washington Avenue, Carlstadt	250 ft. / Bedrock	115	Irrigation	05/17/56
5	Teoneck Chemical Company, 197 Washington Avenue, Carlstadt	137 ft. / Bedrock	20	Industrial	07/01/65
6	Howmedica Inc., 359 Veterans Boulevard, Carlstadt	193 ft. / Bedrock	17	Industrial	08/31/66
7	Thurmann Inc., 670 Dell Road, Carlstadt	500 ft. / Bedrock	150	Cooling	05/27/73
			250	Cooling	04/10/81

REFERENCE

- 1.) BASE MAP TAKEN FROM DIGITAL VERSION OF U.S.G.S. 7.5 MINUTE QUADRANGLE WEEHAWKEN, NEW JERSEY, DATED 1995, SUPPLIED BY AMERICAN DIGITAL CARTOGRAPHY, APPLETON, WISCONSIN.
- 2.) WELL SURVEY INFORMATION OBTAINED FROM THE FOLLOWING:
 - THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NJDEP) WATER WITHDRAWAL POINTS (BUREAU OF WATER ALLOCATION 5 MILE "RADIUS PROGRAM"), 1995.
 - HALF-MILE RADIUS OF 216 PATERSON PLANK ROAD SITE PROVIDED BY NJDEP BUREAU OF WATER ALLOCATION, 1994.
 - DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE SPECIAL AREA MANAGEMENT PLAN FOR THE HACKENSACK MEADOWLANDS DISTRICT, NEW JERSEY (USEPA AND U.S. ARMY CORPS OF ENGINEERS, JUNE 1995).

LEGEND

- 7 ● APPROXIMATE LOCATION OF WELL WITHIN ONE-HALF MILE OF THE 216 PATERSON PLANK ROAD SITE

JAN 21 1997

500 0 500 1000
scale feet

REV	DATE	DESCRIPTION	DR BY	CHK BY	RYW BY
PROJECT: 216 PATERSON PLANK ROAD NPL SITE CARLSTADT, NEW JERSEY					
SHEET TITLE: WELL SURVEY					
PROJECT No. 943-6222		FILE No.: NJ03-615			
CLIENT PROJ. No.		DRAFTING SUBTITLE: 11			
DES BY	SDM	12/05/96	SCALE: AS SHOWN		
DR BY	MRM	01/07/97			
CHK BY	SD	1/20/97			
RVW BY		1/20/97			

FIGURE 11

APPENDIX A
Well Decommissioning Form

DWR-020
5/95

New Jersey Department of Environmental Protection
Water Supply Element — Bureau of Water Allocation

WELL ABANDONMENT REPORT

MAIL TO: Bureau of Water Allocation
CN 426
Trenton, NJ 08625-0426

WELL PERMIT # Unknown
of well sealed

DATE WELL SEALED 8-11-96

PROPERTY OWNER Gotham Industrial Park Property
ADDRESS 320 Gotham Parkway Carlstadt NJ
WELL LOCATION 320 Gotham Parkway Carlstadt NJ
Street & No., Township, County
MWD13 Lt 11 Blk 123.01
Well No. Lot & Block No.

USE OF WELL PRIOR TO ABANDONMENT: monitoring

REASON FOR ABANDONMENT: moved to another location

WAS A NEW WELL DRILLED? ☒ YES

☐ NO

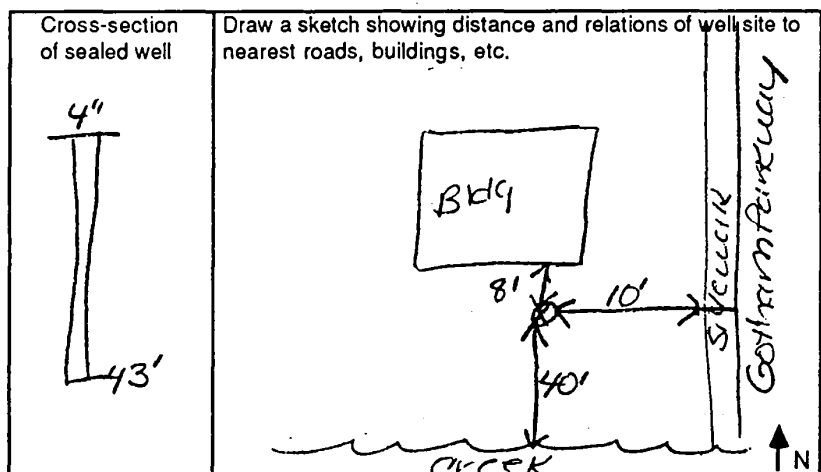
PERMIT # OF NEW WELL: 26-42132

TOTAL DEPTH OF WELL 43
DIAMETER 4
CASING LENGTH 2
SCREEN LENGTH 2
NUMBER OF CASINGS 1

MATERIAL USED TO SEAL WELL:

28 Gallons of Water
400 Lbs. of Cement
20 Lbs. of Bentonite
N/A Lbs. of Sand/Gravel
(none if well is contaminated)

FORMATION: ☐ Consolidated
☒ Unconsolidated



To permit adequate grouting, the casing should remain in place, but ungrouted liner pipes or any other obstructions must be removed. Pressure grouting is the only accepted method.

WAS CASING LEFT IN PLACE? ☒ YES

☐ NO

CASING MATERIAL: Stainless Steel

WERE OTHER OBSTRUCTIONS LEFT IN WELL? ☐ YES

☒ NO

WHAT WERE THE OBSTRUCTIONS: _____

IF "YES", AUTHORIZATION GRANTED BY _____

(NJDEP Official)

ON _____

(Date)

I certify that this well was sealed in accordance with N.J.A.C. 7:9-9.1 et seq.

Thomas Brown
Name of NJ Certified Well Sealer
Performing Work (Print or Type)

100 Lexington Ave
Trenton NJ 08618
Address

[Signature]
Signature of NJ Certified Well Sealer
Performing Work

9-30-96
Mailing Date
1311
License #

9.088

COPIES: White - Water Allocation

Yellow - Owner

Pink - Health Dept.

Goldenrod - Driller

R2-0000345

APPENDIX B

Borehole & Monitoring Well Construction Logs and Forms A & B

Monitoring Well Construction Logs

MONITORING WELL INSTALLATION LOG

JOB NO. 943-6222 PROJECT CARLSTADT/FAC. COORD./NJ WELL NO. MW-8R SHEET 1 of 1
 GA INSP. M. ELSNER DRILLING METHOD HOLLOW STEM AUGER/WASH ROTARY/CORING GROUND ELEV. 5.35 WATER DEPTH 1.90 BGS
 WEATHER SUNNY DRILLING COMPANY AQUIFER DRILLING AND TESTING COLLAR ELEV. 5.11 DATE/TIME 07-24-96/1135
 TEMP. 90° F DRILL RIG CANTERRA CT-250 DRILLER T. BROWN STARTED 0740/07-18-96 COMPLETED 1515/07-18-96
 LOCATION / COORDINATES N 2165174.99 E 725114.28 TIME / DATE

MATERIALS INVENTORY

WELL CASING 2 in. dia. 83 I.T. WELL SCREEN 2 in. dia. 10 I.T. BENTONITE SEAL NONE USED
 CASING TYPE 304 STAINLESS STEEL SCREEN TYPE 304 STAINLESS STEEL INSTALLATION METHOD N/A
 JOINT TYPE FLUSH THREADED W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 250 LBS. #1/85 LBS. #D
 GROUT QUANTITY 55 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE MORIE SAND
 GROUT TYPE 5% CEMENT/BENTONITE DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	For detailed lithologic description, see boring and drillhole log MW-8R.		
	GROUND SURFACE		
0.00	0.0-1.0 ft. ASPHALT.		Drilled using 14" HSA to 13' below ground surface. Pushed 10' steel casing to 14' bgs and grouted in place. Drilled using 10" HSA to 59' bgs. Cored using NQ barrel to 64' bgs. Drilled using 10" HSA to 65' bgs. Drilled using 4" wash rotary to 69' bgs. Cored using NQ barrel to 79' bgs. Reamed to 79' using 10" wash rotary and set 6" steel casing and grouted in place. Cored using NQ barrel to 129' bgs. Grouted to 97' bgs and reamed hole to 6" to a depth of 97'. Installed filter pack to 94' bgs. Suspended casing and screen in hole and installed sand pack to 81'. Installed filter pack to 80' and grouted to surface using a side discharge tremie pipe. Completed well with a 12" flush mount protective cover.
10.00	1.0-5.0 ft. SAND, some silt with pieces of brick material. 5.0-7.5 ft. PEAT grading to a silty clay. 7.5-11.0 ft. Fine SAND, some silt grading to medium sand. 11.0-17.0 ft. Bedded CLAY grading from fine sand to silt to clay.		
20.00	17.0-38.7 ft. Massive CLAY.		
30.00			
40.00	38.7-45.0 ft. SILTY CLAY, trace to little fine to coarse sand, trace to little fine to coarse gravel.		
50.00	45.0-69.0 ft. SILTY CLAY to clayey silt and fine to coarse sand, little to some fine to coarse gravel.		
60.00			
70.00	69.0-123.5 ft. Thinly bedded brick red SILTSTONE.		
80.00			
90.00			
100.00			
	123.5-129.0 ft. Massive brick red, fine SANDSTONE. BORING TERMINATED AT 129.0 FT. BELOW GROUND SURFACE.		
130.00			

MONITORING WELL INSTALLATION LOG

JOB NO. 943-6222 PROJECT CARLSTADT/FAC. COORD./NJ WELL NO. MW-10D SHEET 1 of 1
 GA INSP. M. ELSNER DRILLING METHOD HOLLOW STEM AUGER/WASH ROTARY GROUND ELEV. 7.49 WATER DEPTH 8.3' TOC
 WEATHER CLOUDY DRILLING COMPANY AQUIFER DRILLING AND TESTING COLLAR ELEV. 7.09 DATE/TIME 08-26-96/0854
 TEMP. 75° F DRILL RIG FAILING STRATA STAR 10 DRILLER T. BROWN STARTED 1350/08-21-96 COMPLETED 1525/08-21-96
 LOCATION / COORDINATES N 725213.48 E 2164433.14 TIME / DATE

MATERIALS INVENTORY

WELL CASING 4 in. dia. 37 I.F. WELL SCREEN 4 in. dia. 5 I.F. BENTONITE SEAL NONE USED
 CASING TYPE 304 STAINLESS STEEL SCREEN TYPE 304 STAINLESS STEEL INSTALLATION METHOD N/A
 JOINT TYPE FLUSH THREADED W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 65 LBS. #1/40 LBS. #0
 GROUT QUANTITY 60 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE MORIE SAND
 GROUT TYPE 5% CEMENT/BENTONITE DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	For detailed lithologic description, see boring and drillhole log MW-10R.		
	GROUND SURFACE		
0.00	0.0-0.2 ft. TOPSOIL.		Drilled using 12" hollow stem auger to 20' below ground surface. Pushed 8" steel casing to 21' bgs and grouted in place. Drilled using 8" wash rotary to 42' bgs. Placed screen and casing in hole and installed sand pack to 36.5' bgs. Installed filter pack to 35.5' and grouted to surface using a slide discharge tremie pipe. Completed well with a 12" flush mount protective cover.
10.00	0.2-4.0 ft. SILT, ironstone from 3.0-4.0 ft. 4.0-6.5 ft. CLAYEY SILT. 6.5-10.0 ft. PEAT grading to silty clay.		
20.00	10.0-14.0 ft. Firm SAND and SILT, interlayered clay. 14.0-18.0 ft. Bedded CLAY, grading from fine sand to silt to clay. 18.0-26.0 ft. Massive CLAY.		
30.00	26.0-42.0 ft. SILTY CLAY, trace to some fine to coarse sand, trace gravel.		
40.00	BORING TERMINATED AT 42.0 FT. BELOW GROUND SURFACE.		
50.00			
60.00			
70.00			
80.00			
90.00			
100.00			
110.00			

MONITORING WELL INSTALLATION LOG

JOB NO. <u>943-6222</u>	PROJECT <u>CARLSTADT/FAC. COORD./NJ</u>	WELL NO. <u>MW-10R</u>	SHEET <u>1</u> of <u>1</u>
GA INSP. <u>S. MITCHELL</u>	DRILLING METHOD <u>HOLLOW STEM AUGER/WASH ROTARY/CORING</u>	GROUND ELEV. <u>7.48</u>	WATER DEPTH <u>7.65' BGS</u>
WEATHER <u>SUNNY</u>	DRILLING COMPANY <u>AQUIFER DRILLING AND TESTING</u>	COLLAR ELEV. <u>7.01</u>	DATE/TIME <u>08-26-96/1542</u>
TEMP. <u>80° F</u>	DRILL RIG <u>FAILING STRATA STAR 10</u> DRILLER <u>T. BROWN</u>	STARTED <u>0837/08-23-96</u>	COMPLETED <u>1353/08-26-96</u>
LOCATION / COORDINATES <u>N 725207.45 E 2164440.10</u>		TIME / DATE	TIME / DATE

MATERIALS INVENTORY			
WELL CASING <u>2</u> in. dia. <u>55.5</u> l.f.	WELL SCREEN <u>2</u> in. dia. <u>10</u> l.f.	BENTONITE SEAL <u>NONE USED</u>	
CASING TYPE <u>304 STAINLESS STEEL</u>	SCREEN TYPE <u>304 STAINLESS STEEL</u>	INSTALLATION METHOD <u>N/A</u>	
JOINT TYPE <u>FLUSH THREADED W/ O-RINGS</u>	SLOT SIZE <u>0.010" MACHINE SLOTTED</u>	FILTER PACK QTY. <u>N/A</u>	
GROUT QUANTITY <u>N/A</u>	CENTRALIZERS <u>NONE USED</u>	FILTER PACK TYPE <u>N/A</u>	
GROUT TYPE <u>N/A</u>	DRILLING MUD TYPE <u>N/A</u>	INSTALLATION METHOD <u>N/A</u>	

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	For detailed lithologic description, see boring and drillhole log MW-10R.		
	GROUND SURFACE		
0.00	0.0-0.2 ft. TOPSOIL. 0.2-4.0 ft. SILT, ironstone from 3.0-4.0 ft.		Drilled using 12" hollow stem auger to 20' below ground surface. Pushed 8" steel casing to 21' bgs and grouted in place. Drilled using 8"
	4.0-6.5 ft. CLAYEY SILT.		HSA to 45.5' bgs. Cored using NQ barrel to 55.5' bgs. Reamed using
10.00	6.5-10.0 ft. PEAT grading to silty clay. 10.0-14.0 ft. Firm SAND and SILT, interlayered clay.		8" air rotary to 55.5' bgs. Installed 4" steel casing in hole and grouted in place. Cored using HQ barrel to
	14.0-18.0 ft. Bedded CLAY, grading from fine sand to silt to clay.		65.5 ft. Placed screen and riser in
20.00	18.0-26.0 ft. Massive CLAY.		Completed with a 12" flush mount protective cover.
30.00	26.0-42.0 ft. SILTY CLAY, trace to some fine to coarse sand, trace gravel.		
40.00			
	42.0-44.0 ft. SILTY CLAY and fine to coarse SAND, some fine to coarse gravel.		
50.00	44.0-65.5 ft. Moderately weathered, thinly bedded, brick red SILTSTONE.		
60.00			
	BORING TERMINATED AT 65.5 FT. BELOW GROUND SURFACE.		
70.00			
80.00			
90.00			
100.00			
110.00			

MONITORING WELL INSTALLATION LOG

JOB NO. 943-6222 PROJECT CARLSTADT/FAC. COORD./NJ WELL NO. MW-11R SHEET 1 of 1
 GA INSP. S. MITCHELL DRILLING METHOD HOLLOW STEM AUGER/WASH ROTARY/CORING GROUND ELEV. 6.41 WATER DEPTH 5.7' BGS
 WEATHER SUNNY DRILLING COMPANY AQUIFER DRILLING AND TESTING COLLAR ELEV. 6.19 DATE/TIME 08-07-96/1545
 TEMP. 85° F DRILL RIG FAILING STRATA STAR 10 DRILLER T. BROWN STARTED 1052/08-07-96 COMPLETED 1530/08-07-96
 LOCATION / COORDINATES N 725551.44 E 2164273.24

MATERIALS INVENTORY

WELL CASING 4 in. dia. 47.9 I.F. WELL SCREEN 4 in. dia. 10.1 I.F. BENTONITE SEAL NONE USED
 CASING TYPE STEEL SCREEN TYPE OPEN BOREHOLE INSTALLATION METHOD N/A
 JOINT TYPE WELDED SLOT SIZE N/A FILTER PACK QTY. N/A
 GROUT QUANTITY N/A CENTRALIZERS NONE USED FILTER PACK TYPE N/A
 GROUT TYPE N/A DRILLING MUD TYPE N/A INSTALLATION METHOD N/A

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	For detailed lithologic description, see boring and drillhole log MW-11R.		
	GROUND SURFACE		
0.00	0.0-0.5 ft. TOPSOIL.		Drilled using 18" hollow stem auger to 20.5' below ground surface. Pushed 12" steel casing to 21.5' bgs and grouted in place. Drilled using 12" HSA to 30' bgs. Pushed 8" steel casing to 31' bgs and grouted in place. Drilled using 8" HSA to 38'.
10.00	8.0-10.0 ft. PEAT.		Cored using NQ barrel to 48'.
	10.0-20.0 ft. CLAYEY SILT grading to a bedded clay grading from fine sand to silt clay.		Reamed using 8" wash rotary to 48' bgs. Installed 4" steel casing to 47.9' and grouted in place.
20.00	20.0-27.7 ft. Massive CLAY.		Cored using HQ barrel to 58' bgs. Completed well with a 24" square flush mount well vault.
30.00	27.7-32.0 ft. SILTY CLAY, trace to little fine to coarse sand, trace fine gravel.		
	32.0-38.0 ft. CLAYEY SILT, little to some fine to coarse sand, little to some fine to coarse gravel.		
40.00	38.0-38.6 ft. SILTSTONE.		
	38.6-43.6 ft. Fine grained massive SANDSTONE.		
	43.6-58.0 ft. SILTSTONE.		
50.00			
60.00	BORING TERMINATED AT 58.0 FT. BELOW GROUND SURFACE.		
70.00			
80.00			
90.00			
100.00			
110.00			

MONITORING WELL INSTALLATION LOG

JOB NO. 943-6222 PROJECT CARLSTADT/FAC. COORD./NJ WELL NO. MW-14D SHEET 1 of 1
 GA INSP. M. ELSNER DRILLING METHOD HOLLOW STEM AUGER/WASH ROTARY GROUND ELEV. 2.45 WATER DEPTH 1.0' BGS
 WEATHER SUNNY DRILLING COMPANY AQUIFER DRILLING AND TESTING COLLAR ELEV. 2.19 DATE/TIME 07-29-96/0920
 TEMP. 80° F DRILL RIG MOBILE B-59 DRILLER T. BROWN STARTED 1000/07-28-96 COMPLETED 1415/07-26-96
 LOCATION / COORDINATES N 725767.51 E 2164795.35 TIME / DATE

MATERIALS INVENTORY

WELL CASING 4 in. dia. 30 I.F. WELL SCREEN 4 in. dia. 10 I.F. BENTONITE SEAL NONE USED
 CASING TYPE 304 STAINLESS STEEL SCREEN TYPE 304 STAINLESS STEEL INSTALLATION METHOD N/A
 JOINT TYPE FLUSH THREADED W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 800 LBS. #1/50 LBS. #0
 GROUT QUANTITY 85 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE MORIE SAND
 GROUT TYPE 5% CEMENT/BENTONITE DRILLING MUD TYPE BENTONITE INSTALLATION METHOD GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	For detailed lithologic description, see boring and drillhole log MW-14R.		
	GROUND SURFACE		Drilled using 12" hollow stem auger to 14' below ground surface. Pushed 8" steel casing to 15' and grouted in place. Drilled using 8" wash rotary to 41'. Suspended casing and screen in hole and installed sand pack to 28' bgs. Installed filter pack to 27' bgs and grouted to the surface using a side discharge tremie pipe. Completed well with a 12" flush mount protective cover.
0.00	0.0-1.0 ft. ASPHALT.		
	1.0-5.0 ft. CLAYEY SILT and SILTY CLAY.		
	5.0-8.5 ft. PEAT.		
10.00	8.5-13.0 ft. Bedded CLAY grading to fine sand, silt and clay.		
	13.0-24.3 ft. Massive CLAY.		
20.00			
	24.3-29.0 ft. SILTY CLAY, little to some fine to coarse sand, trace fine gravel.		
30.00	29.0-34.5 ft. CLAYEY SILT, some to and fine to coarse sand, little fine gravel. (33.0-34.5 ft. Medium to coarse SAND, some silt.)		
40.00	34.5-41.0 ft. SILTY CLAY and CLAYEY SILT, little to some fine to coarse sand, trace to some fine to coarse gravel.		
	BORING TERMINATED AT 41.0 FT. BELOW GROUND SURFACE.		
50.00			
60.00			
70.00			
80.00			
90.00			
100.00			
110.00			

MONITORING WELL INSTALLATION LOG

JOB NO. <u>943-6222</u>	PROJECT <u>CARLSTADT/FAC. COORD./NJ</u>	WELL NO. <u>MW-14R</u>	SHEET <u>1</u> of <u>1</u>
GA INSP. <u>M. ELSNER</u>	DRILLING METHOD <u>HOLLOW STEM AUGER/AIR ROTARY/CORING</u>	GROUND ELEV. <u>2.37</u>	WATER DEPTH <u>2.26'</u> BGS
WEATHER <u>CLOUDY</u>	DRILLING COMPANY <u>AQUIFER DRILLING AND TESTING</u>	COLLAR ELEV. <u>2.22</u>	DATE/TIME <u>07-23-96/1420</u>
TEMP. <u>70° F</u>	DRILL RIG <u>MOBILE B-59</u>	DRILLER <u>T. BROWN</u>	STARTED <u>0945/07-23-96</u>
LOCATION / COORDINATES <u>N 725763.51 E 2164802.30</u>		COMPLETED <u>1328/07-23-96</u>	

MATERIALS INVENTORY

WELL CASING <u>4</u> in. dia. <u>34</u> l.f. WELL SCREEN <u>4</u> in. dia. <u>10</u> l.f. BENTONITE SEAL <u>NONE USED</u>
CASING TYPE <u>STEEL</u> SCREEN TYPE <u>OPEN BOREHOLE</u> INSTALLATION METHOD <u>N/A</u>
JOINT TYPE <u>WELDED</u> SLOT SIZE <u>N/A</u> FILTER PACK QTY. <u>N/A</u>
GROUT QUANTITY <u>N/A</u> CENTRALIZERS <u>NONE USED</u> FILTER PACK TYPE <u>N/A</u>
GROUT TYPE <u>N/A</u> DRILLING MUD TYPE <u>N/A</u> INSTALLATION METHOD <u>N/A</u>

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	For detailed lithologic description, see boring and drillhole log MW-14R.		
	GROUND SURFACE		
0.00	0.0-1.0 ft. ASPHALT.		Drilled using 12" hollow stem auger to 14' below ground surface. Pushed 8" steel casing to 15'10" bgs.
	1.0-5.0 ft. CLAYEY SILT and SILTY CLAY.		Drilled using 8" HSA to 54' bgs.
	5.0-8.5 ft. PEAT.		Cored using NQ barrel to 64' bgs.
10.00	8.5-13.0 ft. Bedded CLAY grading to fine sand, silt and clay.		Reamed using 8" wash rotary to 64' bgs. Installed 4" steel casing in hole and grouted in place. Cored using HQ barrel to 74' bgs.
	13.0-24.3 ft. Massive CLAY.		Completed well with a 12" flush mount protective cover.
20.00			
	24.3-29.0 ft. SILTY CLAY, little to some fine to coarse sand, trace fine gravel.		
30.00	29.0-34.5 ft. CLAYEY SILT, some to and fine to coarse sand, little fine gravel. (33.0-34.5 ft. Medium to coarse SAND, some silt.)		
40.00	34.5-54.0 ft. SILTY CLAY and CLAYEY SILT, little to some fine to coarse sand, trace to some fine to coarse gravel.		
50.00			
	54.0-74.0 ft. Moderately weathered, thinly bedded, brick red SILTSTONE.		
60.00			
70.00			
	BORING TERMINATED AT 74.0 FT. BELOW GROUND SURFACE.		
80.00			
90.00			
100.00			
110.00			

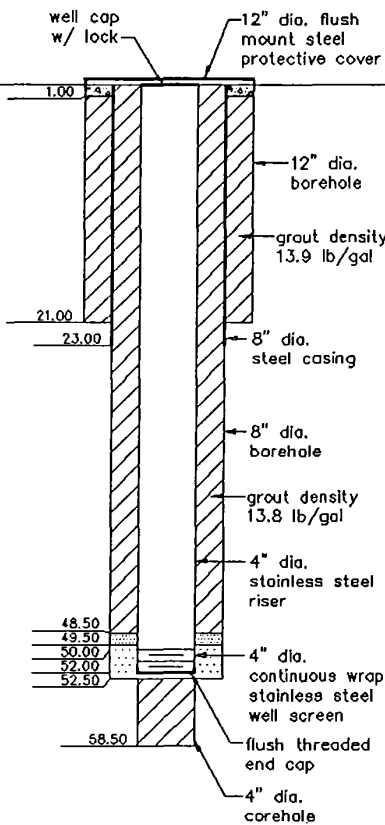
MONITORING WELL INSTALLATION LOG

JOB NO. <u>943-6222</u>	PROJECT <u>CARLSTADT/FAC. COORD./NJ</u>	WELL NO. <u>MW-15D</u>	SHEET <u>1</u> of <u>1</u>
GA INSP. <u>M. ELSNER</u>	DRILLING METHOD <u>HOLLOW STEM AUGER/WASH ROTARY/CORING</u>	GROUND ELEV. <u>9.68</u>	WATER DEPTH <u>5.80 BGS</u>
WEATHER <u>CLOUDY</u>	DRILLING COMPANY <u>AQUIFER DRILLING AND TESTING</u>	COLLAR ELEV. <u>9.47</u>	DATE/TIME <u>08-19-96/1034</u>
TEMP. <u>70° F</u>	DRILL RIG <u>CANTERRA CT-250</u>	DRILLER <u>T. BROWN</u>	STARTED <u>1220/08-16-96</u>
LOCATION / COORDINATES <u>N 725666.52 E 2163930.32</u>		COMPLETED <u>1358/08-16-96</u>	

MATERIALS INVENTORY

WELL CASING <u>4</u> in. dia. <u>50</u>	I.F. WELL SCREEN <u>4</u> in. dia. <u>2</u>	I.F. BENTONITE SEAL <u>NONE USED</u>	
CASING TYPE <u>304 STAINLESS STEEL</u>	SCREEN TYPE <u>304 STAINLESS STEEL</u>	INSTALLATION METHOD <u>TREMIE PIPE</u>	
JOINT TYPE <u>FLUSH THREADED W/ O-RINGS</u>	SLOT SIZE <u>0.010" MACHINE SLOTTED</u>	FILTER PACK QTY. <u>50 LBS. #1/10 LBS. #0</u>	
GROUT QUANTITY <u>110 GALLONS</u>	CENTRALIZERS <u>NONE USED</u>	FILTER PACK TYPE <u>MORIE SAND</u>	
GROUT TYPE <u>5% CEMENT/BENTONITE</u>	DRILLING MUD TYPE <u>N/A</u>	INSTALLATION METHOD <u>GRAVITY</u>	

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	For detailed lithologic description, see boring and drillhole log MW-15D.		
	GROUND SURFACE		
0.00	0.0-0.5 ft. TOPSOIL.		Augered to 21' below ground surface.
	0.5-6.0 ft. Fine to medium SAND, little fine gravel grading to silty sand.		Pushed 8" steel casing to 23' bgs and grouted in place. Sampled to 53.5'. Cored to 58.5'. Grouted 6 gallons up to 52'. Reamed to 52' using 8" wash rotary.
10.00	6.0-10.0 ft. FILL.		Suspended casing in hole and installed sand pack to 49.5'.
	10.0-13.0 ft. PEAT.		Installed filter pack to 48.5' and grouted to the surface using a side discharge tremie pipe. Completed well with a 12" flush mount protective cover.
	13.0-16.0 ft. CLAYEY SILT and SILTY CLAY.		
20.00	16.0-21.0 ft. Bedded SILTY CLAY grading to fine sand to silt to clay.		
	21.0-42.0 ft. Massive CLAY.		
30.00			
40.00			
	42.0-47.0 ft. CLAY, some fine to coarse sand.		
50.00	47.0-53.5 ft. CLAYEY SILT grading to silty clay, some fine to coarse sand, some fine to coarse gravel.		
	53.5-58.5 ft. SILTSTONE.		
60.00	BORING TERMINATED AT 58.5 FT. BELOW GROUND SURFACE.		
70.00			
80.00			
90.00			
100.00			
110.00			



WELL DEVELOPMENT NOTES

LEGEND

- CONCRETE PAD
- CEMENT/BENTONITE GROUT
- #0 FILTER PACK
- #1 MORIE SAND

MONITORING WELL INSTALLATION LOG

JOB NO. 943-6222 PROJECT CARLSTADT/FAC. COORD./NJ WELL NO. MW-16D SHEET 1 of 1
 GA INSP. M. ELSNER DRILLING METHOD HOLLOW STEM AUGER/AIR ROTARY/CORING GROUND ELEV. 7.25 WATER DEPTH 5.87 BGS
 WEATHER CLOUDY DRILLING COMPANY AQUIFER DRILLING AND TESTING COLLAR ELEV. 6.59 DATE/TIME 08-01-96/0910
 TEMP. 80° F DRILL RIG MOBILE B-59 DRILLER T. BROWN STARTED 1105/07-29-96 COMPLETED 1445/07-29-96
 LOCATION / COORDINATES N 725909.76 E 2164281.57 TIME / DATE

MATERIALS INVENTORY

WELL CASING 4 in. dia. 31 I.F. WELL SCREEN 4 in. dia. 5 I.F. BENTONITE SEAL NONE USED
 CASING TYPE 304 STAINLESS STEEL SCREEN TYPE 304 STAINLESS STEEL INSTALLATION METHOD N/A
 JOINT TYPE FLUSH THREADED W/ O-RINGS SLOT SIZE 0.010" MACHINE SLOTTED FILTER PACK QTY. 450 LBS. #1/50 LBS. #0
 GROUT QUANTITY 65 GALLONS CENTRALIZERS NONE USED FILTER PACK TYPE MORIE SAND
 GROUT TYPE 5% CEMENT/BENTONITE DRILLING MUD TYPE N/A INSTALLATION METHOD GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	For detailed lithologic description, see boring and drillhole log MW-18D.		Drilled using 12" hollow stem auger to 16' below ground surface. Pushed 8" steel casing to 17' bgs and grouted in place. Drilled using 8" HSA to 40' bgs. Cored using NQ barrel to 45' bgs. Grouted up to 37' bgs. Suspended casing in hole and installed sand pack to 28' bgs. Installed filter pack to 27' and grouted to the surface using a side discharge tremie pipe. Completed well with a 12" flush mount protective cover.
0.00	GROUND SURFACE		
0.00	0.0-4.0 ft. Fine SAND, some silt, trace coarse gravel.		
10.00	4.0-12.0 ft. CLAYEY SILT, some to and fine to coarse sand, trace to little fine to coarse gravel.		
	12.0-16.0 ft. Bedded CLAY grading to silt to clay.		
	16.0-20.0 ft. Massive CLAY.		
20.00	20.0-23.8 ft. SILTY CLAY.		
	23.8-33.5 ft. SILTY CLAY, some fine to coarse sand, trace fine to coarse gravel.		
30.00	33.5-36.0 ft. CLAYEY SILT and to some fine to coarse sand, trace to little fine to coarse gravel.		
40.00	36.0-38.0 ft. SILTY CLAY, some fine to coarse sand, little fine to coarse gravel.		
	BORING TERMINATED AT 45.0 FT. BELOW GROUND SURFACE.		
50.00			
60.00			
70.00			
80.00			
90.00			
100.00			
110.00			

MONITORING WELL INSTALLATION LOG

JOB NO. <u>943-6222</u>	PROJECT <u>CARLSTADT/FAC. COORD./NJ</u>	WELL NO. <u>MW-170</u>	SHEET <u>1</u> of <u>1</u>
GA INSP. <u>M. ELSNER</u>	DRILLING METHOD <u>HOLLOW STEM AUGER/WASH ROTARY</u>	GROUND ELEV. <u>5.05</u>	WATER DEPTH <u>3.43 BGS</u>
WEATHER <u>N/A</u>	DRILLING COMPANY <u>AQUIFER DRILLING AND TESTING</u>	COLLAR ELEV. <u>4.75</u>	DATE/TIME <u>08-01-96/1500</u>
TEMP. <u>N/A</u>	DRILL RIG <u>MOBILE B-59</u>	DRILLER <u>T. BROWN</u>	STARTED <u>0930/07-11-96</u> COMPLETED <u>1110/07-11-96</u>
LOCATION / COORDINATES <u>N 725130.54 E 2165184.87</u>			

MATERIALS INVENTORY			
WELL CASING <u>4</u> in. dia. <u>45</u> I.F. WELL SCREEN <u>4</u> in. dia. <u>10</u> I.F. BENTONITE SEAL <u>NONE USED</u>			
CASING TYPE <u>304 STAINLESS STEEL</u> SCREEN TYPE <u>304 STAINLESS STEEL</u> INSTALLATION METHOD <u>TREMIE PIPE</u>			
JOINT TYPE <u>FLUSH THREADED W/ O-RINGS</u> SLOT SIZE <u>0.010" MACHINE SLOTTED</u> FILTER PACK QTY. <u>400 LBS. #1/50 LBS. #0</u>			
GROUT QUANTITY <u>50 GALLONS</u> CENTRALIZERS <u>NONE USED</u> FILTER PACK TYPE <u>MORIE SAND</u>			
GROUT TYPE <u>5% CEMENT/BENTONITE</u> DRILLING MUD TYPE <u>WATER</u> INSTALLATION METHOD <u>GRAVITY</u>			

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	For detailed lithologic description, see boring and drillhole log MW-8R.		
	GROUND SURFACE		Augered to 14' below ground surface.
0.00	0.0-1.0 ft. ASPHALT.		Pushed 8" steel casing to 15' bgs
	1.0-5.0 ft. SAND, some silt with pieces of brick material.		and grouted in place. Drilled using
	5.0-7.5 ft. PEAT grading to a silty clay.		3" wash rotary to 56' bgs. Reamed
10.00	7.5-11.0 ft. Fine SAND, some silt grading to medium sand.		to 8" using wash rotary. Suspended
	11.0-17.0 ft. Bedded CLAY grading from fine sand to silt to clay.		casing in hole and installed sand
	17.0-38.7 ft. Massive CLAY.		pack to 43' bgs. Installed filter
20.00			pack to 42' bgs and grouted to
			surface using a slide discharge
30.00			tremie pipe. Completed well with
			a 12" flush mount protective cover.
40.00	38.7-45.0 ft. SILTY CLAY, trace to little fine to coarse sand, trace to little fine to coarse gravel.		
	45.0-56.0 ft. SILTY CLAY to clayey silt and fine to coarse sand, little to some fine to coarse gravel.		
50.00			
60.00	BORING TERMINATED AT 56.0 FT. BELOW GROUND SURFACE.		
70.00			
80.00			
90.00			
100.00			
110.00			

The well sketch shows a vertical cross-section of the well. At the top is a 'well cap w/ lock' at elevation 1.00. Below it is a '12" dia. flush mount steel protective cover' at elevation 4.75. The casing is '12" dia. barehole' from 4.75 to 14.00, then '8" dia. steel casing' from 14.00 to 15.00. Below 15.00 is an '8" dia. borehole' until 42.00, followed by a '4" dia. stainless steel riser' until 43.00. At 43.00, there is a '4" dia. continuous wrap stainless steel well screen' until 55.00, and a 'flush threaded end cap' at 56.00. Grout densities are noted as 14.8 lb/gal and 14.2 lb/gal.

WELL DEVELOPMENT NOTES

Augered to 14' below ground surface. Pushed 8" steel casing to 15' bgs and grouted in place. Drilled using 3" wash rotary to 56' bgs. Reamed to 8" using wash rotary. Suspended casing in hole and installed sand pack to 43' bgs. Installed filter pack to 42' bgs and grouted to surface using a slide discharge tremie pipe. Completed well with a 12" flush mount protective cover.

LEGEND

CONCRETE PAD

CEMENT/BENTONITE GROUT

#0 FILTER PACK

#1 MORIE SAND

MONITORING WELL INSTALLATION LOG

JOB NO. 943-6222 PROJECT CARLSTADT/FAC. COORD./NJ WELL NO. MW-18D SHEET 1 of 1
 GA INSP. M. ELSNER DRILLING METHOD HOLLOW STEM AUGER/AIR ROTARY GROUND ELEV. 5.23 WATER DEPTH 3.34' BGS
 WEATHER SUNNY DRILLING COMPANY AQUIFER DRILLING AND TESTING COLLAR ELEV. 4.51 DATE/TIME 07-30-96/1407
 TEMP. 90° F DRILL RIG REICH DRILL DRILLER J. JAWORSKI STARTED 1138/07-18-96 COMPLETED 1426/07-18-96
 LOCATION / COORDINATES N 725121.40 E 2165180.32 TIME / DATE TIME / DATE

ELEV./DEPTH	SOIL/ROCK DESCRIPTION	WELL SKETCH	INSTALLATION NOTES
	For detailed lithologic description, see boring and drillhole log MW-8R.		Augered to 13' below ground surface. Pushed 8" steel casing to 15' bqs and grouted in place. Reamed to 67' using 8" air rotary. Installed well screen and riser. Bottom of well at 66.5' bqs. Installed sand pack to 61' and filter pack to 60'. Grouted to the surface using a side discharge tremie pipe. Completed well with a 12" flush mount protective cover.
	GROUND SURFACE		
0.00	0.0-1.0 ft. ASPHALT.		
	1.0-5.0 ft. SAND, some silt with pieces of brick material		
	5.0-7.5 ft. PEAT grading to a silty clay.		
10.00	7.5-11.0 ft. Fine SAND, some silt grading to medium sand.		
	11.0-17.0 ft. Bedded CLAY grading from fine sand to silt to clay.		
20.00	17.0-38.7 ft. Massive CLAY.		
30.00			
40.00	38.7-45.0 ft. SILTY CLAY, trace to little fine to coarse sand, trace to little fine to coarse gravel.		
50.00	45.0-67.0 ft. SILTY CLAY to clayey silt and fine to coarse sand, little to same fine to coarse gravel.		
60.00			
70.00	BORING TERMINATED AT 67.0 FT. BELOW GROUND SURFACE.		
80.00			
90.00			
100.00			
110.00			

WELL SKETCH

INSTALLATION NOTES

Augered to 13' below ground surface. Pushed 8" steel casing to 15' bqs and grouted in place. Reamed to 67' using 8" air rotary. Installed well screen and riser. Bottom of well at 66.5' bqs. Installed sand pack to 61' and filter pack to 60'. Grouted to the surface using a side discharge tremie pipe. Completed well with a 12" flush mount protective cover.

WELL DEVELOPMENT NOTES

LEGEND

- CONCRETE PAD
- CEMENT/BENTONITE GROUT
- #0 FILTER PACK
- #1 MORIE SAND

Borehole Logs

PROJECT: CARLSTADT/FAC. COORD./NJ
 PROJECT LOCATION: CARLSTADT, NEW JERSEY
 PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-8R

BORING START: 06-25-96
 BORING LOCATION: N 725114.3 E 2165175.0

SHEET: 1 OF 2
 DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE				SAMPLES					REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV DEPTH	NUMBER	TYPE	BLOWS / 8 in	N	REC/ATT		
0	H.S.A./AIR ROTARY/CORING	0.0-1.0 ft. ASPHALT and crushed rock subbase.			5.35 0.00 4.35						HEAD SPACE READINGS	
		1.0-5.0 ft. Very dense reddish-brown SAND, some silt with pieces of red-brick material. (FILL)			1.00	S-1	SS	10,14,50/0	>64	7"/18"	1-2.5 ft. 0.0 ppm	
											2.5-5 ft. 0.0 ppm	
5		5.0-6.8 ft. Very soft, black organic CLAY with vegetative matter (PEAT). Gray clayey silt is present within the organic clay near the bottom.	PT		0.35 5.00	S-3	SS	1,1,1,1	2	23"/24"	5-7 ft. 0.0 ppm	
		6.8-7.5 ft. Very soft, gray CLAYEY SILT.	ML		-1.45 6.80							
		7.5-10.8 ft. Stiff to very stiff, greenish-gray, fine SAND, some silt with rusty yellow mottling.	SM		7.50	S-4	SS	5,5,8,7	14	13"/24"	7-9 ft. 0.0 ppm	
10						S-5	SS	10,11,16,17	27	13"/24"	9-11 ft. 0.0 ppm	
		10.8-11.0 ft. Compact, reddish-brown, medium SAND, some silt.	SM		-5.45 11.00	S-6	SS	11,12,14,16	26	8"/24"	11-13 ft. 0.0 ppm	
		11.0-13.0 ft. Very stiff, bedded brownish-gray CLAY, grading from fine sand to silt to clay. Each couplet several mm thick with the fine sand lenses < 1/2 mm thick, coloring varigated consisting of gray and yellowish-brown.	CL		-7.65 13.00	S-7	SS	4,4,3,4	7	20"/24"	13-15 ft. 0.0 ppm	
15		13.0-17.0 ft. Firm, bedded gray CLAY, grading from silt to clay.	CL			S-8	SS	4,3,4,4	7	18"/24"	15-17 ft. 0.0 ppm	
		17.0-38.7 ft. Soft, pinkish-gray to light reddish-gray massive CLAY.			-11.65 17.00	S-9	SS	4,4,4,3	8	24"/24"	17-19 ft. 0.0 ppm	
20						S-10	SS	3,2,2,2	4	17"/24"	19-21 ft. 0.0 ppm	
						S-11	SS	3,1,3,2	4	21"/24"	21-23 ft. 0.0 ppm	
						S-12	SS	3,1,1,1	2	12"/24"	23-25 ft. 0.0 ppm	
25						S-13	SS	1,1,1,1	2	24"/24"	25-27 ft. 0.0 ppm	
						S-14	SS	1,2,2,2	4	24"/24"	27-29 ft. 0.0 ppm	
30						S-15	SS	2,1,1,1	2	24"/24"	29-31 ft. 0.0 ppm	
						S-16	SS	1,1,2,1	3	24"/24"	31-33 ft. 0.0 ppm	
						S-17	SS	0,0,1,1	1	24"/24"	33-35 ft. 0.0 ppm	
35						S-18	SS	0,1,1,1	2	24"/24"	35-37 ft. 0.0 ppm	
						S-19	SS	1,1,1,1	2	24"/24"	37-39 ft. 0.0 ppm	
40		38.7-45.0 ft. Firm to stiff, reddish-brown SILTY CLAY, trace to little fine to coarse sand, trace to little fine to coarse gravel.	CL		-33.35 38.70 -34.65 40.00	S-20	SS	1,2,3,4	5	20"/24"	39-41 ft. 0.0 ppm	

DRILL RIG: MOBILE B-59
 DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
 DRILLER: T. BROWN

Golder Associates

LOGGED: SDM/MME/RV
 CHECKED: *EV*
 DATE: 12-02-96

R2-0000359

PROJECT: CARLSTADT/FAC. COORD./NJ
 PROJECT LOCATION: CARLSTADT, NEW JERSEY
 PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-8R

BORING START: 06-25-96
 BORING LOCATION: N 725114.3 E 2165175.0

SHEET: 2 OF 2
 DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE			SAMPLES					REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG ELEV DEPTH	NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT		
40	H.S.A./AIR ROTARY CORING	38.7-45.0 ft. Firm to stiff, reddish-brown SILTY CLAY, trace to little fine to coarse sand, trace to little fine to coarse gravel.	CL	-34.65 40.00	S-20	SS	1,2,3,4	5	20'/24"	39-41 ft. 0.0 ppm	
					S-21	SS	5,4,4,4	8	18'/24"	41-43 ft. 0.0 ppm	
					S-22	SS	5,5,6,5	11	19'/24"	43-45 ft. 0.0 ppm	
45		45.0-49.0 ft. Hard, brick red SILTY CLAY, some to and fine to coarse sand, trace to little fine to coarse gravel.	CL-SW	-39.65 45.00	S-23	SS	4,36,24,38	60	16'/24"	45-47 ft. 0.0 ppm	
					S-24	SS	25,33,41,50	74	21'/24"	47-49 ft. 0.0 ppm	
50		49.0-53.0 ft. Hard, brick red to reddish-brown CLAYEY SILT and fine to coarse SAND, little to some fine to coarse gravel.	ML-SW	-43.65 49.00	S-25	SS	26,72,84,122	156	20'/24"	49-51 ft. 0.0 ppm	
					S-26	SS	80,183	> 183	8'/12"	51-52 ft. 0.0 ppm	
					S-27	SS	100/5',100/3'	> 100	8'/8"	53-53.8 ft. 0.0 ppm	
55		53.0-59.0 ft. Hard, reddish-brown SILTY CLAY and fine to coarse GRAVEL, some fine to coarse sand.	ML-GW	-47.65 53.00	S-28	SS	46,75,150/5"	> 225	15'/17"	55-56.5 ft. 0.0 ppm	
					S-29	SS	200/5"	> 200	5'/5"	57-57.5 ft. 0.0 ppm	
60		59.0-60.0 ft. Red SILTSTONE boulder with green alteration and reduction zones.		-53.65 59.00						Augered to 59.0 ft. Begin to core.	
		60.0-69.0 ft. Red brick SILTY CLAY with angular, red siltstone fragments (> 2" in diameter) and red siltstone boulders, thinly laminated.	CL	-54.65 60.00							
65											
70		BORING TERMINATED AT 59.0 FT. BELOW GROUND SURFACE. CORING BEGAN AT 59.0 FT. AND TERMINATED AT 129.0 FT.		-63.65 69.00							
75											
80											

DRILL RIG: MOBILE B-59
 DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
 DRILLER: T. BROWN

Golder Associates

LOGGED: SDM/MME/RV
 CHECKED: RV
 DATE: 12-02-96

R2-0000360

RECORD OF DRILLHOLE MW-8R

Sheet 1 of 4

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT NO: 943-6222
LOCATION: CARLSTADT, NEW JERSEY

BORING METHOD: HQ
DRILLING DATE: 06-27-96
DRILL RIG: MOBILE B-59

DATUM: MSL
COORDINATES N: 725114.3
AZIMUTH: 000

REFERENCE ELEV:
E: 2165175.0
INCLINATION: -90

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ROCK TYPE												HYDRAULIC CONDUCTIVITY cm/sec	NOTES WATER LEVELS INSTRUMENTATION
			<div> <div>B-Bedding</div> <div>BR-Broken</div> <div>C-Curved</div> <div>CA-Calcite</div> <div>CH-Chlorite</div> </div> <div> <div>CL-Clayey</div> <div>CO-Contact</div> <div>F-Fresh</div> <div>FA-Fault</div> <div>FE-Iron</div> </div> <div> <div>FR-Fracture</div> <div>G-Ground</div> <div>I-Irregular</div> <div>J-Joint</div> <div>K-Sickensided</div> </div> <div> <div>LI-Limonite</div> <div>MN-Manganese</div> <div>PL-Planar</div> <div>QTZ-Quartz</div> <div>R-Rough</div> </div> <div> <div>SM-Smooth</div> <div>SP-Stepped</div> <div>ST-Stepped</div> <div>UE-Uneven</div> <div>W-Wavy</div> </div>													
			ELEV DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES # PER FOOT	DISCONTINUITY DATA			TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG				
								0	30	90						
0	For lithologic description from 0.0-59.0 ft., see soil boring log MW-8R.															
5																
10																
15																
20																
25																
30																
35																
40																

CONTINUED ON NEXT PAGE

DEPTH SCALE: 1 INCH = 5 FEET
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

LOGGED: ELSNER/RAMESH
CHECKED: *[Signature]*
DATE: 01-17-97



R2-0000361

RECORD OF DRILLHOLE MW-8R

Sheet 2 of 4

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT NO: 843-6222
LOCATION: CARLSTADT, NEW JERSEY

BORING METHOD: HQ
DRILLING DATE: 06-27-96
DRILL RIG: MOBILE B-59

DATUM: MSL
COORDINATES N: 725114.3
AZIMUTH: 000

REFERENCE ELEV:
E: 2165175.0
INCLINATION: -90

DEPTH SCALE (FEET)	ROCK TYPE	DESCRIPTION	GRAPHIC LOG	ELEV DEPTH (FT)	RUN NO.	CORE RECOVERY	ROD	FRACTURES PER FOOT	DISCONTINUITY DATA			HYDRAULIC CONDUCTIVITY cm/sec	NOTES WATER LEVELS INSTRUMENTATION	
									TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG				
														0
40	CONTINUED FROM PREVIOUS PAGE													
45	For lithologic description from 0.0-59.0 ft., see soil boring log MW-8R.													
50														
55														
60		59.0-60.0 ft. Brick red SILTSTONE boulder.		59.00										
		60.0-61.5 ft. Brick red SILTY CLAY till, very hard.		60.00	1									
		61.5-62.0 ft. Boulder.		61.50										
		62.0-64.0 ft. Till.		62.00	2									
65		64.0-69.0 ft. No sample.		64.00										
70		69.0-123.5 ft. Slightly weathered, thinly bedded, calcareous, brick red, slightly micaceous SILTSTONE with greenish-gray reduction spotting. Dissolution vugs <1/2" dia. at 69.0-80.5 ft., 84.0-92.0 ft., and 98.0-111.0 ft. White calcareous spotting within matrix and along fractures.		69.00	3	90								
75														
80		CONTINUED ON NEXT PAGE		80.00	4	90								

300 gallons lost at 64.0 ft.

DEPTH SCALE: 1 INCH = 5 FEET
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

LOGGED: ELSNER/RAMESH
CHECKED: RY
DATE: 01-17-97

 Golder Associates

R2-0000362

RECORD OF DRILLHOLE MW-8R

Sheet 3 of 4

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT NO: 843-6222
LOCATION: CARLSTADT, NEW JERSEY

BORING METHOD: HQ
DRILLING DATE: 06-27-96
DRILL RIG: MOBILE B-59

DATUM: MSL
COORDINATES N: 725114.3
AZIMUTH: 000

REFERENCE ELEV:
E: 2165175.0
INCLINATION: -80

DEPTH SCALE (FEET)	ROCK TYPE		GRAPHIC LOG	ELEV DEPTH (FT)	DISCONTINUITY DATA										HYDRAULIC CONDUCTIVITY cm/sec	NOTES WATER LEVELS INSTRUMENTATION
	DESCRIPTION	RUN NO.			CORE RECOVERY	RQD	FRACTURES PER FOOT	DIP w/1 CORE			TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG				
								0	30	60						
													AXIS	90		
80	CONTINUED FROM PREVIOUS PAGE			80.00											Interconnected fracture/vug zones at 80-81 ft., 83-85 ft., 88-89 ft., and 97-98 ft.	
85			4	90												
90																
95			5	94												
	97.5-98.0 ft. Decomposed.															
	98.0-99.0 ft. Highly weathered MUDSTONE.			98.00												
100				99.00												
105			6	82												
	107.0-108.0 ft. Missing "decomposed" zone.															
110																
	113.0-114.0 ft. Missing.															
115	115.0 ft. 1 mm Dolomite seam.		7	100												
120	CONTINUED ON NEXT PAGE		8	100												

DEPTH SCALE: 1 INCH = 5 FEET
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

LOGGED: ELSNER/RAMESH
CHECKED: 2/✓
DATE: 01-17-97

 Golder Associates

R2-0000363

RECORD OF DRILLHOLE MW-8R

Sheet 4 of 4

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT NO: 943-6222
LOCATION: CARLSTADT, NEW JERSEY

BORING METHOD: HQ
DRILLING DATE: 06-27-98
DRILL RIG: MOBILE B-59

DATUM: MSL
COORDINATES N: 725114.3
AZIMUTH: 000

REFERENCE ELEV:
E: 2165175.0
INCLINATION: -90

DEPTH SCALE (FEET)	ROCK TYPE	DESCRIPTION	GRAPHIC LOG	ELEV DEPTH (FT)	RUN NO.	CORE RECOVERY	ROD	FRACTURES PER FOOT	DISCONTINUITY DATA		HYDRAULIC CONDUCTIVITY cm/sec	NOTES WATER LEVELS INSTRUMENTATION
									TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG		
120	CONTINUED FROM PREVIOUS PAGE											
120.00		69.0-123.5 ft. Slightly weathered, thinly bedded, calcareous, brick red, slightly micaceous SILTSTONE with greenish-gray reduction spotting. Dissolution vugs <1/2" dia. at 69.0-80.5 ft., 84.0-92.0 ft., and 98.0-111.0 ft. White calcareous spotting within matrix and along fractures. 121.0-122.0 ft. Dolomite seams.		120.00								
123.50		123.5-129.0 ft. Fresh, massive, calcareous, micaceous, brick red, fine SANDSTONE with white calcareous spotting within matrix and along fractures.		123.50	8	100						
125												
130		CORING TERMINATED AT 129.0 FT. BELOW GROUND SURFACE.		129.00								
135												
140												
145												
150												
155												
160												

DEPTH SCALE: 1 INCH = 5 FEET
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

LOGGED: ELSNER/RAMESH
CHECKED: *RV*
DATE: 01-17-97



R2-0000364

PROJECT: CARLSTADT/FAC. COORD./NJ

PROJECT LOCATION: CARLSTADT, NEW JERSEY

PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-10R

BORING START: 08-14-96

BORING LOCATION: N 725207.5 E 2164440.1

SHEET: 1 OF 2

DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE			SAMPLES					REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG ELEV DEPTH	NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT		
0	H.S.A./AIR ROTARY/CORING	0.0-0.2 ft. Black SANDY SILT with roots. (Topsoil).	ML	7.48 0.20	S-1	SS	12,23,25,20	48	12"/24"	HEAD SPACE READINGS 0-2 ft. 0.0 ppm	
		0.2-3.0 ft. Hard, brown SILT, little fine to coarse sand, little gravel.		4.48 3.00 3.48	S-2	SS	18,30,28,32	58	12"/24"	2-4 ft. 0.0 ppm	
		3.0-4.0 ft. Reddish-brown cemented SILT. (Ironstone?)	PT	4.00 3.48	S-3	SS	18,38,150/5*	>150	12"/17"	4-6 ft. 0.0 ppm	
5		4.0-6.5 ft. Hard, reddish-brown CLAYEY SILT, trace to little fine to medium sand with pieces of coal and ironstone (up to 1/2" in diameter) at 5.8-6.0 ft., grayish-white cemented, fine to medium sand and fragments of concrete block at 6.0-6.5 ft.		0.98 6.50	S-4	SS	24,5,3,3	8	6"/24"	6-8 ft. 0.0 ppm	
		6.5-8.0 ft. Firm, black PEAT, slightly micaceous.	OL-PT	-0.52 8.00	S-5	SS	3,5,6,8	11	18"/24"	8-10 ft. 0.0 ppm	
		8.0-10.0 ft. Black, organic SILTY CLAY with vegetative matter (Peat).		-2.52 10.00	S-6	SS	3,4,5,6	9	18"/24"	10-12 ft. 0.0 ppm	
10		10.0-14.0 ft. Loose to dense, greenish, fine SAND and SILT interlayered clay with yellow-brown mottling. Greenish sandy clay with 1/2" thick layer of brown, fine sand at 13.0-14.0 ft.	SM	-6.52 14.00	S-7	SS	5,15,19,18	34	18"/24"	12-14 ft. 0.0 ppm	
		14.0-18.0 ft. Stiff to very stiff, bedded, grayish-yellowish-brown CLAY, grading from fine sand to silt to clay. Each couplet several mm thick with the fine sand layers <1/2" mm thick. Coloring variegated consisting of gray and yellow brown.		-10.52 18.00	S-8	SS	9,7,8,14	15	20"/24"	14-16 ft. 0.0 ppm	
15		18.0-26.0 ft. Stiff to very soft, massive CLAY with alternating colors of gray and pinkish-gray.	CH	-18.52 26.00	S-9	SS	7,8,8,7	16	24"/24"	16-18 ft. 0.0 ppm	
					S-10	SS	8,9,5,5	14	24"/24"	18-20 ft. 0.0 ppm	
20					S-11	SS	10,3,3,3	6	24"/24"	20-22 ft. 0.0 ppm	
					S-12	SS	4,2,2,2	4	24"/24"	22-24 ft. 0.0 ppm	
					S-13	SS	WOR	0	24"/24"	24-26 ft. 0.0 ppm	
25		26.0-34.0 ft. Very soft to soft, reddish-brown SILTY CLAY, trace to some fine to coarse sand, trace gravel.	CL	-26.52 34.00	S-14	SS	WOR,1,1,1	2	24"/24"	26-28 ft. 0.0 ppm	
					S-15	SS	2,2,1,2	3	24"/24"	28-30 ft. 0.0 ppm	
30					S-16	SS	WOR	0	24"/24"	30-32 ft. 0.0 ppm	
					S-17	SS	2,2,2,2	4	24"/24"	32-34 ft. 0.0 ppm	
					S-18	SS	WOR,2,2,3	4	24"/24"	34-36 ft. 0.0 ppm	
35		34.0-42.0 ft. Firm, brick red SILTY CLAY, some fine to coarse sand, trace gravel.	CL	-32.52 40.00	S-19	SS	2,2,3,3	5	24"/24"	36-38 ft. 0.0 ppm	
					S-20	SS	21,3,3,4	6	24"/24"	38-40 ft. 0.0 ppm	
40											

DRILL RIG: CANTERRA 250/STARR 10
 DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
 DRILLER: T. BROWN

Golder Associates

LOGGED: MITCHELL/ELSNER
 CHECKED: 2v
 DATE: 12-02-96

R2-0000365

PROJECT: CARLSTADT/FAC. COORD./NJ

RECORD OF BOREHOLE MW-10R

SHEET: 2 OF 2

PROJECT LOCATION: CARLSTADT, NEW JERSEY



BORING START: 08-14-96

DATUM: MSL

PROJECT NUMBER: 943-6222

BORING LOCATION: N 725207.5 E 2164440.1



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE				SAMPLES				REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV	NUMBER	TYPE	BLOWS / 6 In	N			REC/ATT
					DEPTH							
40	H.S.A./AIR ROTARY/CORING	34.0-42.0 ft. Firm, brick red SILTY CLAY, some fine to coarse sand, trace gravel.	CL		-32.52 40.00	S-21	SS	1,2,3,3	5	24'/24"	40-42 ft. 0.0 ppm	
		42.0-44.0 ft. Hard, brick red SILTY CLAY and fine to coarse sand, some fine to coarse gravel.	CL-SW		-34.52 42.00	S-22	SS	18,34,100/4	>134	15'/15'	42-43.4 ft. 0.0 ppm	
45		BORING TERMINATED AT 45.0 FT. BELOW GROUND SURFACE. CORING BEGAN AT 45.0 FT. AND TERMINATED AT 65.0 FT. BELOW GROUND SURFACE.			-36.52 44.00	S-23	SS	200/4	>200	4'/4"		
50												
55												
60												
65												
70												
75												
80												

DRILL RIG: CANTERRA 250/STARR 10
 DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
 DRILLER: T. BROWN

Golder Associates

LOGGED: MITCHELL/ELSNER
 CHECKED: RV
 DATE: 12-02-96

R2-0000366

RECORD OF DRILLHOLE MW-10R

Sheet 1 of 2

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT NO: 943-6222
LOCATION: CARLSTADT, NEW JERSEY

BORING METHOD: NQ/HQ
DRILLING DATE: 08-20-96
DRILL RIG: STAR 10

DATUM: MSL
COORDINATES N: 725207.5
AZIMUTH: 000

REFERENCE ELEV:
E: 2164440.1
INCLINATION: -90

DEPTH SCALE (FEET)	ROCK TYPE		DISCONTINUITY DATA										HYDRAULIC CONDUCTIVITY cm/sec	NOTES WATER LEVELS INSTRUMENTATION
	DESCRIPTION	GRAPHIC LOG	ELEV DEPTH (FT)	RUN NO.	CORE RECOVERY	ROD	FRACTURES PER FOOT	DIP WRT CORE AXIS			TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG		
								0	30	90				
0	For lithologic description from 0.0-44.5 ft., see soil boring log MW-10R.													
5														
10														
15														
20														
25														
30														
35														
40														

CONTINUED ON NEXT PAGE

DEPTH SCALE: 1 INCH = 5 FEET
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

LOGGED: MITCHELL/ELSNER
CHECKED: *Rv*
DATE: 01-17-97



R2-0000367

RECORD OF DRILLHOLE MW-10R

Sheet 2 of 2

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT NO: 843-6222
LOCATION: CARLSTADT, NEW JERSEY

BORING METHOD: NQ/HQ
DRILLING DATE: 08-20-96
DRILL RIG: STAR 10

DATUM: MSL
COORDINATES N: 725207.5
AZIMUTH: 000

REFERENCE ELEV:
E: 2164440.1
INCLINATION: -90

DEPTH SCALE (FEET)	ROCK TYPE		GRAPHIC LOG	ELEV DEPTH (FT)	B-Bedding BR-Broken C-Curved CA-Calcite CH-Chloritic CL-Clayey CO-Contact F-Fresh FA-Fault FE-Iron FR-Fracture G-Ground I-Irregular J-Joint K-Sickensided LI-Limonite MN-Manganese PL-Planar QTZ-Quartz R-Rough SM-Smooth SP-Stepped ST-Stepped UE-Uneven W-Wavy										HYDRAULIC CONDUCTIVITY cm/sec	NOTES WATER LEVELS INSTRUMENTATION	
	DESCRIPTION	GRAPHIC LOG			RUN NO.	CORE RECOVERY	ROD	FRACTURES PER FOOT	DISCONTINUITY DATA					TYPE AND SURFACE DESCRIPTION			GRAPHIC LOG
									0	30	45	60	90				
40	CONTINUED FROM PREVIOUS PAGE																
45	44.5-65.5 ft. Moderately weathered, thinly bedded, calcareous, brick red, slightly micaceous SILTSTONE with greenish-gray reduction spotting. Dissolution vugs <1/2" dia. at 51.0-53.0 ft. and 55.5-65.5 ft.			44.50	1	83										Lost 150 gallons of water to formation during run 1.	
50																	
55					2	100											
60					3	90											
65					4	25										Lost 400 gallons of water to formation during run 4.	
	CORING TERMINATED AT 65.5 FT. BELOW GROUND SURFACE.			65.50													
70																	
75																	
80																	

DEPTH SCALE: 1 INCH = 5 FEET
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

LOGGED: MITCHELL/ELSNER
CHECKED: *LV*
DATE: 01-17-97

 Golder Associates

R2-0000368

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT LOCATION: CARLSTADT, NEW JERSEY
PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-11R

BORING START: 07-26-96
BORING LOCATION: N 725551.4 E 2164273.2

SHEET: 1 OF 2
DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE			SAMPLES					REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG DEPTH	NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT		
0	H.S.A. WASH ROTARY/CORING	0.0-0.5 ft. Very stiff, black organic SILT and fine SAND. (Topsoil)	OL	6.41 0.00 0.50	S-1	SS	10,15,27,19	42	24'/24"	HEAD SPACE READINGS 0-2 ft. 0.0 ppm	
		0.5-2.0 ft. Very dense, reddish-brown SAND, some silt, some pieces of concrete.		4.41 2.00	S-2	SS	21,25,29,29	54	24'/24"	2-4 ft. 0.0 ppm	
		2.0-3.5 ft. Very dense, reddish-brown SAND, some silt, some fine to coarse gravel.	SM	2.91 3.50	S-3	SS	20,37,15,11	52	24'/24"	4-6 ft. 0.0 ppm	
5		3.5-8.0 ft. Very dense to loose, brown to tan, fine to medium SAND, some silt, little to trace fine gravel.	SM		S-4	SS	4,4,4,3	8	24'/24"	6-8 ft. 0.0 ppm	
		8.0-10.0 ft. Soft, dark brown organic SILT with vegetative matter, trace fine sand. (Peat)	OL-PT	-1.59 8.00 -3.59	S-5	SS	2,2,2,2	4	24'/24"	8-10 ft. 2.5 ppm	
10		10.0-14.0 ft. Very stiff, bluish-gray and brownish-red CLAYEY SILT, trace to little fine sand, trace to little fine gravel.	ML	10.00	S-6	SS	10,11,13,20	24	24'/24"	10-12 ft. 0.0 ppm	
					S-7	SS	14,11,10,15	21	24'/24"	12-14 ft. 0.0 ppm	
15		14.0-16.0 ft. Stiff to firm, bedded, bluish-gray CLAYEY SILT grading to a silty clay with layers of fine sand > 1/2 mm thick.	ML	-7.59 14.00 -9.59	S-8	SS	5,6,6,9	14	24'/24"	14-16 ft. 60.0 ppm	
		16.0-20.0 ft. Stiff to firm, bedded, bluish-gray CLAY grading from fine sand to silt to clay. Each couplet several mm thick with fine sand layers < 1/2 mm thick. Coloring variegated consisting of gray and yellowish-brown. Discoloration noted within the fine sand and silt layers (black).	CL	16.00	S-9	SS	5,7,7,6	14	24'/24"	16-18 ft. 100.0 ppm	
					S-10	SS	4,4,3,4	7	24'/24"	18-20 ft. 140.0 ppm	
20		20.0-24.0 ft. Firm to very soft, reddish-brown and pinkish-gray, massive CLAY.	CH	-13.59 20.00	S-11	SS	4,4,4,4	8	24'/24"	20-22 ft. 0.0 ppm	
					S-12	SS	1,1,1,1	2	24'/24"	22-24 ft. 0.0 ppm	
25		24.0-27.7 ft. Firm, pinkish-gray CLAY, trace to little fine to coarse sand, trace gravel, trace fine sand in < 1/2 mm thick layer. At 27.5 ft., < 1/2 mm thick fine sand layer with black discoloration.	CH	-17.59 24.00	S-13	SS	2,2,2,2	4	24'/24"	24-26 ft. 1.3 ppm	
					S-14	SS	1,2,3,4	5	24'/24"	26-28 ft. 350.0 ppm	
		27.7-30.0 ft. Firm to very stiff, brick red SILTY CLAY, trace to little fine to coarse sand, trace fine gravel.	CL	-21.29 27.70	S-15	SS	3,4,6,4	12	24'/24"	28-30 ft. 0.0 ppm	
30		30.0-31.8 ft. Stiff, pinkish-gray CLAY and brick red SILTY CLAY, trace fine to coarse sand, trace fine gravel.	CL	-23.59 30.00	S-16	SS	2,5,4,5	9	24'/24"	30-32 ft. 0.0 ppm	
					S-17	SS	11,15,23,24	38	24'/24"	31.8-32 ft. 0.0 ppm	
35		31.8-32.0 ft. Stiff, brick red SILTY CLAY, trace to little fine to coarse sand, trace fine gravel.		32.00	S-18	SS	100/4	> 100	2'/4"	34-34.2 ft. 0.0 ppm	
		32.0-38.0 ft. Hard, brick red to reddish-brown CLAYEY SILT, little to some fine to coarse sand, little to some fine to coarse gravel.	ML		S-19	SS	28,54,76,34	132	12'/24"		
					S-20	SS	41,100/5	> 100	7'/9"	37-37.3 ft. 0.0 ppm	
40		BORING TERMINATED AT 38.0 FT. BELOW GROUND SURFACE. CORING BEGAN AT 38.0 FT. AND TERMINATED AT 58.0 FT.		-31.59 38.00 -33.59 40.00							

DRILL RIG: STARR 10
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

Golder Associates

LOGGED: MITCHELL/ELSNER
CHECKED: RV
DATE: 12-06-96

R2-0000369

PROJECT: CARLSTADT/FAC. COORD./NJ

PROJECT LOCATION: CARLSTADT, NEW JERSEY

PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-11R

BORING START: 07-26-96

BORING LOCATION: N 725551.4 E 2164273.2

SHEET: 2 OF 2

DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE				SAMPLES				REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV	NUMBER	TYPE	BLOWS / 6 in	N			REC/ATT
					DEPTH							
40	H.S.A./WASH ROTARY/CORING				-33.59 40.00							
45												
50												
55												
60		BORING TERMINATED AT 38.0 FT. BELOW GROUND SURFACE. CORING BEGAN AT 38.0 FT. AND TERMINATED AT 58.0 FT.			-51.59 58.00							
65												
70												
75												
80												

DRILL RIG: STARR 10

DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.

DRILLER: T. BROWN

Golder Associates

LOGGED: MITCHELL/ELSNER

CHECKED: RV

DATE: 12-06-96

R2-0000370

RECORD OF DRILLHOLE 11R

Sheet 1 of 2

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT NO: 843-6222
LOCATION: CARLSTADT, NEW JERSEY

BORING METHOD: NO/HQ (WATER)
DRILLING DATE: 08-02-96
DRILL RIG: STARR-10

DATUM: MSL
COORDINATES N: 725551.4
AZIMUTH: 000

REFERENCE ELEV: 6.41
E: 2164273.2
INCLINATION: -90

DEPTH SCALE (FEET)	ROCK TYPE		GRAPHIC LOG	ELEV DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES # PER FOOT	DISCONTINUITY DATA				HYDRAULIC CONDUCTIVITY cm/sec	NOTES WATER LEVELS INSTRUMENTATION
	DESCRIPTION	TYPE AND SURFACE DESCRIPTION							GRAPHIC LOG	TYPE AND SURFACE DESCRIPTION				
0	For lithologic description from 0.0-38.0 ft., see soil boring log 11-R.			6.41 0.00										
5														
10														
15														
20														
25														
30														
35														
38.0-38.6 ft.	Slightly weathered, thinly laminated, calcareous, reddish-brown SILTSTONE.			-31.59										
38.6-43.6 ft.	Slightly weathered, massive, calcareous, dark reddish-brown, fine grained, micaceous SANDSTONE.			-32.19 -38.60 -33.59	1	100								
40	CONTINUED ON NEXT PAGE			40.00										

DEPTH SCALE: 1 INCH=5 FEET
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

LOGGED: S. MITCHELL
CHECKED: ZV
DATE: 12-06-96



R2-0000371

RECORD OF DRILLHOLE 11R

Sheet 2 of 2

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT NO: 843-6222
LOCATION: CARLSTADT, NEW JERSEY

BORING METHOD: NQ/HQ (WATER)
DRILLING DATE: 08-02-96
DRILL RIG: STARR-10

DATUM: MSL
COORDINATES N: 725551.4
AZIMUTH: 000

REFERENCE ELEV: 6.41
E: 2164273.2
INCLINATION: -90

DEPTH SCALE (FEET)	ROCK TYPE		GRAPHIC LOG	ELEV DEPTH (FT)	DISCONTINUITY DATA										HYDRAULIC CONDUCTIVITY cm/sec	NOTES WATER LEVELS INSTRUMENTATION
	DESCRIPTION	RUN NO.			CORE RECOVERY	RQD	FRACTURES PER FOOT	DIP WRT CORE AXIS	TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG						
40	CONTINUED FROM PREVIOUS PAGE			-33.59												
	38.6-43.6 ft. Slightly weathered, massive, calcareous, dark reddish-brown, fine grained, micaceous SANDSTONE.			40.00												
45	43.6-58.0 ft. Thinly laminated, calcareous, reddish-brown, slightly micaceous SILTSTONE.			43.60	1	100										
	(43.6-44.4 ft. Moderately weathered; 44.4-48.0 ft. Fresh to faintly weathered; 48.0-56.0 ft. Slightly weathered; 56.0-58.0 ft. Moderately to highly weathered with vugs notably at 56.0-56.3 ft., 56.5 ft., and 57.4-57.8 ft.)															
50					2	100										
55					3	100										
60	BORING TERMINATED AT 38.0 FT. BELOW GROUND SURFACE. CORING BEGAN AT 38.0 FT. AND TERMINATED AT 58.0 FT.			58.00												
65																
70																
75																
80																

DEPTH SCALE: 1 INCH=5 FEET
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

LOGGED: S. MITCHELL
CHECKED: *RW*
DATE: 12-06-96

 Golder Associates

R2-0000372

PROJECT: CARLSTADT/FAC. COORD./NJ

PROJECT LOCATION: CARLSTADT, NEW JERSEY

PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-14R

BORING START: 07-17-96

BORING LOCATION: N 725763.5 E 2164802.3

SHEET: 1 OF 2

DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE			SAMPLES					REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG ELEV DEPTH	NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT		
0	H.S.A./AIR ROTARY/CORING	0.0-1.0 ft. ASPHALT with crushed stone as subbase.		2.37 0.00 1.37 1.00						HEAD SPACE READINGS	
		1.0-5.0 ft. Hard, dark gray CLAYEY SILT and SILTY CLAY, some fine to coarse sand, little fine to coarse gravel. (Pieces of rock material up to 1" in diameter).			S-1	SS	12,25,15,9	40	8'/24"	1-3 ft. 0.0 ppm	
					S-2	SS	12,25,10,9	35	4'/24"	3-5 ft. 0.0 ppm	
5		5.0-7.0 ft. Firm, dark gray, organic, SILTY CLAY, trace fine sand with vegetative matter. (PEAT)	OL-PT	-2.63 5.00	S-3	SS	2,4,3,4	7	15'/24"	5-7 ft. 0.0 ppm	
		7.0-8.5 ft. Stiff, dark gray to black, organic PEAT, very fibrous with some clay and layers of dark gray, fine sand.	PT	-4.63 7.00	S-4	SS	4,5,4,10	9	24'/24"	7-9 ft. 5.0 ppm	
		8.5-13.0 ft. Stiff to very stiff, bedded, brownish-gray SILTY CLAY grading to clay, grading to fine sand to silt to clay. Each couplet several mm thick with fine sand layers < 1/2 mm thick. Coloring variegated, consisting of gray and yellowish-brown.	CL	-6.13 8.50	S-5	SS	9,9,12,13	21	24'/24"	9-11 ft. 54.0 ppm	
					S-6	SS	7,7,4,4	11	10'/24"	11-13 ft. 25.0 ppm	
10		13.0-24.3 ft. Firm to soft, gray to pinkish-gray, massive CLAY, trace fine sand in < 1/2 mm thick layer.		-10.63 13.00	S-7	SS	3,3,2,2	5	8'/24"	13-15 ft. 0.0 ppm	
					S-8	SS	1,1,1,1	2	15'/24"	15-17 ft. 0.0 ppm	
					S-9	SS	2,2,1,2	3	24'/24"	17-19 ft. 0.0 ppm	
					S-10	SS	1,1,1,1	2	24'/24"	19-21 ft. 0.0 ppm	
					S-11	SS	2,1,1,1	2	24'/24"	21-23 ft. 0.0 ppm	
					S-12	SS	2,2,2,1	4	24'/24"	23-25 ft. 0.0 ppm	
25		24.3-29.0 ft. Soft to firm, reddish-brown SILTY CLAY, little to some fine to coarse sand, trace fine gravel.	CL	-21.93 24.30	S-13	SS	1,1,2,1	3	12'/24"	25-27 ft. 0.0 ppm	
					S-14	SS	3,3,3,5	6	15'/24"	27-29 ft. 0.0 ppm	
		29.0-33.0 ft. Firm to very stiff, reddish-brown CLAYEY SILT, some to and fine to coarse sand, little fine gravel.	ML-SW	-26.63 29.00	S-15	SS	7,8,17,37	25	9'/24"	29-31 ft. 0.0 ppm	
					S-16	SS	20,30,44,46	74	6'/24"	31-33 ft. 0.0 ppm	
		33.0-34.5 ft. Very dense, reddish-brown, medium to coarse SAND, some silt, trace fine to coarse gravel.	SW	-30.63 33.00	S-17	SS	22,27,100/5	>127	12'/17"	33-34.5 ft. 0.0 ppm	
35		34.5-39.0 ft. Hard, reddish-brown SILTY CLAY, trace to little fine to coarse sand, trace fine to coarse gravel.	CL	-32.13 34.50	S-18	SS	100/5	>100	NR	35-37 ft. N/A	
					S-19	SS	29,8,40,68	48	3'/24"	37-39 ft. 0.0 ppm	
40		39.0-49.0 ft. Hard, reddish-brown CLAYEY SILT, some fine to coarse sand, little to some fine to coarse gravel.	ML	-36.63 39.00 -37.63 40.00	S-20	SS	17,92,37,39	129	15'/24"	39-41 ft. 0.0 ppm	

DRILL RIG: MOBILE B-59R

DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.

DRILLER: T. BROWN

LOGGED: MITCHELL/ELSNER

CHECKED: LV

DATE: 12-02-96

Golder Associates

R2-0000373

PROJECT: CARLSTADT/FAC. COORD./NJ

PROJECT LOCATION: CARLSTADT, NEW JERSEY

PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-14R

BORING START: 07-17-96

BORING LOCATION: N 725763.5 E 2164802.3

SHEET: 2 OF 2

DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE				SAMPLES					REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV DEPTH	NUMBER	TYPE	BLOWS / 6 in	N	REC/ATT		
40	H.S.A./AIR ROTARY/CORING	39.0-49.0 ft. Hard, reddish-brown CLAYEY SILT, some fine to coarse sand, little to some fine to coarse gravel.	ML		-37.63 40.00	S-21	SS	17,82,37,39	129	15'/24"	39-41 ft. 0.0 ppm	
						S-22	SS	42,69,100,100/5	169	17'/23"	41-43 ft. 0.0 ppm	
											43-45 ft. 0.0 ppm	
45						S-23	SS	110,100/4	>100	8'/10"	45-45.8 ft. 0.0 ppm	
						S-24	SS	100,100/3	>100	9'/9"	47-47.8 ft. 0.0 ppm	
		49.0-54.0 ft. Hard, reddish-brown CLAYEY SILT with siltstone fragments grading to a reddish-brown, highly weathered, thinly bedded siltstone interlayered with silty clay.	ML		-46.63 49.00	S-25	SS	200/3	>200	3'/3"	49-49.3 ft. 0.0 ppm	
50						S-26	SS	200/3	>200	3'/3"	51-51.3 ft. 0.0 ppm	
55		BORING TERMINATED AT 54.0 FT. BELOW GROUND SURFACE. CORING BEGAN AT 54.0 FT. AND TERMINATED AT 74.0 FT. BELOW GROUND SURFACE.			-51.63 54.00							
60												
65												
70												
75												
80												

DRILL RIG: MOBILE B-59R

DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.

DRILLER: T. BROWN

LOGGED: MITCHELL/ELSNER

CHECKED: *LV*

DATE: 12-02-96

Golder Associates

R2-0000374

RECORD OF DRILLHOLE MW-14R

Sheet 1 of 2

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT NO: 943-6222
LOCATION: CARLSTADT, NEW JERSEY

BORING METHOD:
DRILLING DATE: 07-19-96
DRILL RIG: MOBILE B-59

DATUM: MSL
COORDINATES N: 725763.5
AZIMUTH: 000

REFERENCE ELEV:
E: 2184802.3
INCLINATION: -90

DEPTH SCALE (FEET)	ROCK TYPE	DESCRIPTION	GRAPHIC LOG	ELEV DEPTH (FT)	DISCONTINUITY DATA										HYDRAULIC CONDUCTIVITY cm/sec	NOTES WATER LEVELS INSTRUMENTATION	
					RUN NO.	CORE RECOVERY	ROD	FRACTURES PER FOOT	DIP Wt			CORE	DIP AXIS	TYPE AND SURFACE DESCRIPTION			GRAPHIC LOG
									0	30	60						
5																	
10																	
15																	
20																	
25																	
30																	
35																	
40																	

CONTINUED ON NEXT PAGE

DEPTH SCALE: 1 INCH = 5 FEET
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

LOGGED: MITCHELL/ELSNER
CHECKED: JV
DATE: 01-17-97



R2-0000375

RECORD OF DRILLHOLE MW-14R

Sheet 2 of 2

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT NO: 943-6222
LOCATION: CARLSTADT, NEW JERSEY

BORING METHOD:
DRILLING DATE: 07-19-96
DRILL RIG: MOBILE B-59

DATUM: MSL
COORDINATES N: 725763.5
AZIMUTH: 000

REFERENCE ELEV:
E: 2164802.3
INCLINATION: -90

DEPTH SCALE (FEET)	ROCK TYPE		GRAPHIC LOG	ELEV DEPTH (FT)	DISCONTINUITY DATA										HYDRAULIC CONDUCTIVITY cm/sec	NOTES WATER LEVELS INSTRUMENTATION
	DESCRIPTION	RUN NO.			CORE RECOVERY	RQD	FRACTURES PER FOOT	DIP WRT CORE			TYPE AND SURFACE DESCRIPTION	GRAPHIC LOG				
								0	30	60						
													AXIS	90		
		B-Bedding BR-Broken C-Curved CA-Calcite CH-Chloritic	CL-Clayey CO-Contact F-Fresh FA-Fault FE-Iron	FR-Fracture G-Ground I-Irregular J-Joint K-Sickensided	LI-Uronite MN-Manganese PL-Planar QTZ-Quartz R-Rough	SM-Smooth SP-Stepped ST-Stepped UE-Uneven W-Wavy										
40	CONTINUED FROM PREVIOUS PAGE															
	For lithologic description from 0.0-54.2 ft., see soil boring log MW-14R.															
45																
50																
55	54.2-57.2 ft. Fresh, thinly laminated, calcareous, reddish-brown SILTSTONE.															
	57.2-58.2 ft. Slightly weathered, thinly laminated, calcareous, reddish-brown SILTSTONE. (Also from 59.0-59.8 ft.)															
	58.2-59.8 ft. Moderately weathered, thinly laminated, calcareous, reddish-brown SILTSTONE with pitting. (Also from 60.9-64.2 ft.)															
60	59.8-60.4 ft. Moderately weathered, thinly laminated, calcareous, reddish-brown, fine grained SANDSTONE.															
	60.4-64.2 ft. Slightly weathered, thinly laminated, calcareous, red SILTSTONE with vugs.															
65	64.2-74.2 ft. Fresh, thinly laminated, calcareous, slightly micaceous, nearly horizontal bedded, brick red SILTSTONE with greenish-gray reduction spotting. Dissolution vugs up to 1" dia. 64.8-65.2 ft., 69.8-70.3 ft., 73.2-74.2 ft.															
70	71.7 ft. Sandstone stringer 1" thick.															
75	CORING TERMINATED AT 74.2 FT. BELOW GROUND SURFACE.															
80																

DEPTH SCALE: 1 INCH = 5 FEET
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

LOGGED: MITCHELL/ELSNER
CHECKED: *Ev*
DATE: 01-17-97

 Golder Associates

R2-0000376

PROJECT: CARLSTADT/FAC. COORD./NJ
PROJECT LOCATION: CARLSTADT, NEW JERSEY
PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-15D

BORING START: 08-12-96
BORING LOCATION: N 725666.5 E 2163930.3

SHEET: 1 OF 2
DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE			SAMPLES					REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV	NUMBER	TYPE	BLOWS / 6 in	N			REC/ATT	
					DEPTH								
0	H.S.A. WASH ROTARY CORING	0.0-0.5 ft. Gray, fine to medium SAND, some silt and roots.	SM		9.68 0.00 0.50						HEAD SPACE READINGS 0-2 ft. 0.0 ppm		
		0.5-5.7 ft. Dense, grayish-tan, fine to medium SAND, little fine gravel, trace silt. 2.0-4.0 ft. 1 mm thick orange-brown sand layers. 5.5 ft. 5 mm thick, dark brown, medium sand layer.	SW			S-1	SS	11,9,7,7	16	24'/24'	2-4 ft. 0.0 ppm		
						S-2	SS	21,20,19,17	39	24'/24'	4-6 ft. 20.0 ppm		
5						S-3	SS	15,8,25,75	33	24'/24'	6-8 ft. 20.0 ppm		
		5.7-6.0 ft. Dense, dark gray, silty, medium to fine SAND, little fine gravel, some root fragments.			3.98 6.00							6-8 ft. 20.0 ppm	
		6.0-10.0 ft. Very dense, grayish-blue, reddish-brown, dark gray FILL consisting of sand, silt, clay and fine gravel with pieces of decomposed wood and asbestos shingles.				S-4	SS	8,25,43,56	68	24'/24'	8-8.3 ft. 0.0 ppm		
					S-5	SS	100/4	>100	4'/6"				
10		10.0-13.0 ft. Firm, dark brown to black, sandy and silty, organic PEAT.	PT		-0.32 10.00							10-12 ft. 0.0 ppm	
		13.0-14.0 ft. Stiff, grayish-green CLAYEY SILT, trace fine sand, trace fine gravel with reddish-brown, 1 mm thick layers, some wood fragments.	ML		-3.32 13.00 -4.32	S-7	SS	3,5,9,16	14	24'/24'	12-14 ft. 0.0 ppm		
						S-8	SS	1,2,4,8	6	24'/24'	14-16 ft. 0.0 ppm		
15		14.0-16.0 ft. Firm, bluish-gray SILTY CLAY with orange staining.	CL		-6.32 16.00							16-18 ft. 0.0 ppm	
		16.0-21.0 ft. Very stiff to stiff, bedded, orange-tan-brown SILTY CLAY grading to fine sand to silt to clay. Each couplet several mm thick with fine sand layers < 1/2 mm thick.	CL			S-9	SS	13,11,12,15	23	24'/24'	18-20 ft. 0.0 ppm		
						S-10	SS	7,6,6,7	12	24'/24'	20-22 ft. 0.0 ppm		
20		21.0-42.0 ft. Very soft, massive CLAY with alternating layers of pinkish-gray and gray, trace fine sand in < 1/2 mm thick layers.	CH		-11.32 21.00	S-11	SS	5,6,6,5	12	24'/24'	22-24 ft. 0.0 ppm		
						S-12	SS	1,1,1,1	2	24'/24'	24-26 ft. 0.0 ppm		
						S-13	SS	WOH,2,1,1	3	24'/24'	26-28 ft. 0.0 ppm		
						S-14	SS	1,1,1,1	2	24'/24'	28-30 ft. 0.0 ppm		
						S-15	SS	1,WOH,1,WOH	1	24'/24'	30-32 ft. 0.0 ppm		
						S-16	SS	1,1,1,1	2	24'/24'	32-34 ft. 0.0 ppm		
						S-17	SS	WOH,1,1,WOH	2	24'/24'	34-36 ft. 0.0 ppm		
30						S-18	SS	WOH,1,WOH	1	24'/24'	36-38 ft. 0.0 ppm		
					S-19	SS	1,1,1,1	2	24'/24'	38-40 ft. 0.0 ppm			
40				-30.32 40.00									

DRILL RIG: MOBILE B-59
DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.
DRILLER: T. BROWN

Golder Associates

LOGGED: M. ELSNER
CHECKED: *LV*
DATE: 12-02-96

R2-0000377

PROJECT: CARLSTADT/FAC. COORD./NJ

PROJECT LOCATION: CARLSTADT, NEW JERSEY

PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-15D

BORING START: 08-12-96

BORING LOCATION: N 725666.5 E 2163930.3

SHEET: 2 OF 2

DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE				SAMPLES					REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV DEPTH	NUMBER	TYPE	BLOWS / 6 In	N	REC/ATT		
40	H.S.A. WASH ROTARY/CORING	21.0-42.0 ft. Very soft, massive CLAY with alternating layers of pinkish-gray and gray, trace fine sand in <1/2 mm thick layers.	CH		-30.32 40.00	S-21	SS	1,1,2,2	3	24'/24"	40-42 ft. 0.0 ppm	
		42.0-47.0 ft. Soft, reddish-gray CLAY, some fine to coarse sand, trace medium to coarse sand grading to a silty clay matrix.	CL		-32.32 42.00	S-22	SS	1,2,2,2	4	24'/24"	42-44 ft. 0.0 ppm	
45						S-23	SS	2,1,2,3	3	24'/24"	44-46 ft. 0.0 ppm	
		47.0-53.5 ft. Hard, reddish-brown CLAYEY SILT grading to a brick red silty clay, some fine to coarse sand, some fine to coarse gravel.	ML		-37.32 47.00	S-24	SS	5,4,13,31	17	24'/24"	46-48 ft. 0.0 ppm	
						S-25	SS	65,100/4	>100	10'/10"	48-48.8 ft. 0.0 ppm	
50						S-26	SS	25,33,36,43	69	24'/24"	50-52 ft. 0.0 ppm	
						S-27	SS	22,100/4	>100	10'/10"	52-52.8 ft. 0.0 ppm	
55		53.5-58.5 ft. Brick red SILTSTONE and fine-grained SANDSTONE.			-43.82 53.50							
60		BORING TERMINATED AT 58.5 FT. BELOW GROUND SURFACE. CORING BEGAN AT 58.5 FT. AND TERMINATED AT 63.5 FT. TO CONFIRM BEDROCK.			-48.82 58.50							
65												
70												
75												
80												

DRILL RIG: MOBILE B-59

DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.

DRILLER: T. BROWN

Golder Associates

LOGGED: M. ELSNER

CHECKED: *21*

DATE: 12-02-98

R2-0000378

PROJECT: CARLSTADT/FAC. COORD./NJ

PROJECT LOCATION: CARLSTADT, NEW JERSEY

PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-16D

BORING START: 07-22-96

BORING LOCATION: N 725909.8 E 2164281.6

SHEET: 1 OF 2

DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE				SAMPLES					REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV DEPTH	NUMBER	TYPE	BLOWS / 6 in	N	RECI/AT		
0	H.S.A./AIR ROTARY CORING	0.0-4.0 ft. Compact to very dense, dark brown to reddish-brown, fine SAND, some silt, trace coarse gravel.	SM		7.25						HEAD SPACE READINGS 0-2 ft. 0.0 ppm	
					0.00	S-1	SS	11,12,11,13	23	2"/24"		
		4.0-12.0 ft. Hard, brownish-gray to reddish-gray CLAYEY SILT, some to and fine to coarse sand, trace to little fine to coarse gravel.	MH-SM			S-2	SS	44,31,31,23	62	6"/24"	2-4 ft. 0.0 ppm	
					3.25							
5					4.00	S-3	SS	19,23,23,24	48	13"/24"	4-6 ft. 0.0 ppm	
						S-4	SS	27,23,43,43	66	12"/24"	6-8 ft. 0.0 ppm	
						S-5	SS	60,32,27,23	59	6"/24"	8-10 ft. 0.0 ppm	
10		12.0-16.0 ft. Stiff, bedded, brownish-gray CLAY grading to silt to clay. Each couplet several mm thick. Coloring variegated, consisting of gray and yellowish-brown.	CL		-4.75	S-6	SS	12,10,10,12	20	3"/24"	10-12 ft. 0.0 ppm	
					12.00	S-7	SS	20,17,13,14	30	NR	12-14 ft. N/A	
		16.0-20.0 ft. Stiff to firm, massive CLAY with alternating layers of pinkish-gray and gray, trace fine sand in < 1/2 mm thick layers.	CH		-8.75	S-8	SS	4,5,8,8	13	5"/24"	14-16 ft. 0.0 ppm	
15					16.00	S-9	SS	6,6,6,4	12	4"/24"	16-18 ft. 0.0 ppm	
		20.0-23.8 ft. Firm to soft, reddish-gray SILTY CLAY.	CH			S-10	SS	4,3,3,3	6	12"/24"	18-20 ft. 0.0 ppm	
					-12.75							
20					20.00	S-11	SS	3,2,2,3	4	24"/24"	20-22 ft. 0.0 ppm	
		23.8-33.5 ft. Firm, reddish-brown SILTY CLAY, some fine to coarse sand, trace fine to coarse gravel.	CL			S-12	SS	2,2,2,3	4	24"/24"	22-24 ft. 0.0 ppm	
					-16.55							
25					23.80	S-13	SS	3,2,7,3	9	24"/24"	24-26 ft. 0.0 ppm	
						S-14	SS	8,2,4,3	6	24"/24"	26-28 ft. 0.0 ppm	
						S-15	SS	4,5,5,16	10	24"/24"	28-30 ft. 0.0 ppm	
						S-16	SS	6,4,5,6	9	24"/24"	30-32 ft. 0.0 ppm	
		33.5-36.0 ft. Hard, reddish-brown CLAYEY SILT and to some fine to coarse sand, trace to little fine to coarse gravel.	CL		-26.25	S-17	SS	11,23,23,40	46	24"/24"	32-34 ft. N/A	
					33.50	S-18	SS	69,200/6	>200	12"/12"	34-35 ft. 0.0 ppm	
35		36.0-38.0 ft. Hard, reddish-brown SILTY CLAY, some fine to coarse sand, little fine to coarse gravel.	CL		-28.75							
					36.00	S-19	SS	41,100/5	>100	11"/12"	36-36.9 ft. 0.0 ppm	
		38.0-40.0 ft. Hard, reddish-brown SILTSTONE fragments with gray reduction zones.			-30.75							
					38.00	S-20	SS	100/2	>100	2"/2"	38-38.2 ft. 0.0 ppm	
40					-32.75							
					40.00							

DRILL RIG: MOBILE B-59

DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.

DRILLER: T. BROWN

LOGGED: MITCHELL/ELSNER

CHECKED: RV

DATE: 01-20-97

Golder Associates

R2-0000379

PROJECT: CARLSTADT/FAC. COORD./NJ

PROJECT LOCATION: CARLSTADT, NEW JERSEY

PROJECT NUMBER: 943-6222

RECORD OF BOREHOLE MW-16D


BORING START: 07-22-96

BORING LOCATION: N 725909.8 E 2164281.6

SHEET: 2 OF 2

DATUM: MSL



DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE				SAMPLES				REMARKS	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV	NUMBER	TYPE	BLOWS / 6 in	N			REC/ATT
					DEPTH							
40	HSA/AIR ROT, CORING	40.0-45.0 ft. Brick red, thinly bedded SILTSTONE.			-32.75 40.00							
45		BORING TERMINATED AND CORING BEGAN AT 40.0 FT. BELOW GROUND SURFACE.			-37.75 45.00							
50												
55												
60												
65												
70												
75												
80												

DRILL RIG: MOBILE B-59

DRILLING CONTRACTOR: AQUIFER DRILLING & TEST.

DRILLER: T. BROWN

LOGGED: MITCHELL/ELSNER

CHECKED: *EV*

DATE: 01-20-97

Golder Associates**R2-0000380**

Form A

MONITORING WELL CERTIFICATION - "FORM A"

NAME OF PERMITTEE: 216 Paterson Plank Rd. Corp
 NAME OF FACILITY: 216 Paterson Plank Rd. Site
 LOCATION: 216 Paterson Plank Rd. Bergen Co., Rumford Bld.
 NJDEPE PERMIT NO: 53623 OR ECRA CASE NO.: _____

CERTIFICATION

WELL PERMIT NUMBER(as assigned by NJDEPE) 26-44015
 OWNER'S WELL NUMBER(as shown on plan) MLW 8R
 WELL COMPLETION DATE 8-28-96
 DISTANCE FROM TOP OF CASING TO GROUND SURFACE 0
 DEPTH TO TOP OF SCREEN FROM TOP OF CASING 83'
 SCREEN LENGTH IN FEET 10'
 SCREEN OR SLOT SIZE 010
 SCREEN OR SLOT MATERIAL 304 stainless steel
 CASING MATERIAL(pvc, steel or other specify) 4" SCH 40 steel - 14' 10"
 CASING DIAMETER 10" steel 2' stainless steel
 STATIC WATER LEVEL 5.0
 YIELD GPM 1
 DEVELOPMENT TECHNIQUE sub pump
 LENGTH OF TIME WELL IS DEVELOPED 8 hrs. PUMPED OR BAILED
 LITHOLOGIC LOG 0-4" Asphalt 12-40' grey clay
4-6' FH 60-70' red brown till

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Thomas Brown
 NAME

[Signature]
 SIGNATURE

1311
 CERTIFICATION OR LICENSE NO.

seal

CERTIFICATION BY EXECUTIVE OFFICER OR DULY AUTHORIZED REP

Dennis C. Moore
 NAME
General Manager
 TITLE

[Signature]
 SIGNATURE
12-13-96
 DATE

MONITORING WELL CERTIFICATION - "FORM A"

NAME OF PERMITTEE: 216 Paterson Plank Rd Corp
NAME OF FACILITY: 216 Paterson Plank Rd site
LOCATION: 216 Paterson Plank Rd. Bergen City, Rutherford Boro
NJDEPE PERMIT NO: 53622 OR ECRA CASE NO.: _____

CERTIFICATION

WELL PERMIT NUMBER(as assigned by NJDEPE) 26-44013
OWNER'S WELL NUMBER(as shown on plan) MW100
WELL COMPLETION DATE 8-28-96
DISTANCE FROM TOP OF CASING TO GROUND SURFACE 0
DEPTH TO TOP OF SCREEN FROM TOP OF CASING 37'
SCREEN LENGTH IN FEET 5
SCREEN OR SLOT SIZE .010
SCREEN OR SLOT MATERIAL 304 Stainless Steel
CASING MATERIAL(pvc, steel or other specify) 304 SS
CASING DIAMETER 4" ss
STATIC WATER LEVEL 45
YIELD GPM 1
DEVELOPMENT TECHNIQUE sub pump
LENGTH OF TIME WELL IS DEVELOPED 8 hrs (PUMPED OR BAILED)
LITHOLOGIC LOG 0-6" top soil 12-14 grey br. silt
6"-10" fill 19-34 grey med clay
10'-12' peat 34'-42' red br till

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Thomas Brown

NAME

1311

CERTIFICATION OR LICENSE NO.

[Signature]

SIGNATURE

seal

CERTIFICATION BY EXECUTIVE OFFICER OR DULY AUTHORIZED REP

Dennis C. Moore

NAME

General Manager

TITLE

[Signature]

SIGNATURE

12-13-96

DATE

MONITORING WELL CERTIFICATION - "FORM A"

NAME OF PERMITTEE: 216 Paterson Plank Rd. Corp
NAME OF FACILITY: 216 Paterson Plank Rd. Site
LOCATION: 216 Paterson Plank Rd. Bergen Co., Rumson, NJ
NJDEPE PERMIT NO: 53022 OR ECRA CASE NO.: _____

CERTIFICATION

WELL PERMIT NUMBER(as assigned by NJDEPE) 26-44014
OWNER'S WELL NUMBER(as shown on plan) MW10R
WELL COMPLETION DATE 8-28-96
DISTANCE FROM TOP OF CASING TO GROUND SURFACE 0
DEPTH TO TOP OF SCREEN FROM TOP OF CASING 55.5'
SCREEN LENGTH IN FEET 10'
SCREEN OR SLOT SIZE .010
SCREEN OR SLOT MATERIAL 304 Stainless Steel
CASING MATERIAL(pvc, steel or other specify) sch 40 steel - 21
CASING DIAMETER 8" steel
4" SS
STATIC WATER LEVEL 3.5
YIELD GPM 1
DEVELOPMENT TECHNIQUE Sub pump
LENGTH OF TIME WELL IS DEVELOPED 8 hrs. (PUMPED OR BAILED)
LITHOLOGIC LOG 0-6" top soil 12'-19' grey & silty
6"-10' F.T.T 19'-34' grey clayed
10'-12' Peat 34'-44.5' Red br fill
44.5'-65.5' Silty stone

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Thomas Brown
NAME
1311

[Signature]
SIGNATURE

CERTIFICATION OR LICENSE NO. _____

seal

CERTIFICATION BY EXECUTIVE OFFICER OR DULY AUTHORIZED REP

Dennis C. Moore
NAME
General Manager
TITLE

[Signature]
SIGNATURE
12-13-96
DATE

MONITORING WELL CERTIFICATION - "FORM A"

NAME OF PERMITTEE: 216 Paterson Plank Rd. Corp
NAME OF FACILITY: 216 Paterson Plank Rd Site
LOCATION: 216 Paterson Plank Rd Basking Ridge, NJ 07005
NJDEPE PERMIT NO: 53625 OR ECRA CASE NO.: _____

CERTIFICATION

WELL PERMIT NUMBER(as assigned by NJDEPE) 26-44020
OWNER'S WELL NUMBER(as shown on plan) MW11R
WELL COMPLETION DATE 8-28-96
DISTANCE FROM TOP OF CASING TO GROUND SURFACE 0
DEPTH TO TOP OF SCREEN FROM TOP OF CASING 48'
SCREEN LENGTH IN FEET 10' open rock hole
SCREEN OR SLOT SIZE _____
SCREEN OR SLOT MATERIAL _____
CASING MATERIAL(pvc, steel or other specify) 3" 40 STEEL 8' - 31'
STEEL 12" 55-4"
CASING DIAMETER _____
STATIC WATER LEVEL 4.5
YIELD GPM 1
DEVELOPMENT TECHNIQUE sub pump
LENGTH OF TIME WELL IS DEVELOPED 8 hrs PUMPED OR BAILED
LITHOLOGIC LOG 0.4' top soil 16'-28' grey clay
0'-8' fill 28'-35' grey clay
8'-10' peat 35'-38' red silt
10'-16' blue silt 38'-58' siltstone

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Thomas Brown

NAME

1311

CERTIFICATION OR LICENSE NO.

seal

[Signature]
SIGNATURE

CERTIFICATION BY EXECUTIVE OFFICER OR DULY AUTHORIZED REP

Dennis C. Moore

NAME

[Signature]
SIGNATURE

TITLE

DATE

General Manager

12-13-96

MONITORING WELL CERTIFICATION - "FORM A"

NAME OF PERMITTEE: 216 Paterson Plank Rd. Corp.
NAME OF FACILITY: 216 Paterson Plank Rd. Site
LOCATION: 216 Paterson Plank Rd. Bergen City, Rutgers-Camden
NJDEPE PERMIT NO: 53623 OR ECRA CASE NO.: _____

CERTIFICATION

WELL PERMIT NUMBER(as assigned by NJDEPE) 26-44016
OWNER'S WELL NUMBER(as shown on plan) MW14D
WELL COMPLETION DATE 8-28-96
DISTANCE FROM TOP OF CASING TO GROUND SURFACE 0
DEPTH TO TOP OF SCREEN FROM TOP OF CASING 30'
SCREEN LENGTH IN FEET 10'
SCREEN OR SLOT SIZE .010
SCREEN OR SLOT MATERIAL 304 stainless steel
CASING MATERIAL(pvc, steel or other specify) 304 stainless steel - 15'
CASING DIAMETER 8" steel
STATIC WATER LEVEL 4" 304 ss
YIELD GPM 1.5'
DEVELOPMENT TECHNIQUE sub pump
LENGTH OF TIME WELL IS DEVELOPED 8 hrs (PUMPED) OR BAILED
LITHOLOGIC LOG sub pump

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Thomas Bous
NAME
1311
CERTIFICATION OR LICENSE NO.

[Signature]
SIGNATURE

seal

CERTIFICATION BY EXECUTIVE OFFICER OR DULY AUTHORIZED REP
Dennis C. Moore
NAME
General manager
TITLE
[Signature]
SIGNATURE
12-13-96
DATE

MONITORING WELL CERTIFICATION - "FORM A"

NAME OF PERMITTEE: 216 Paterson Plank Rd Corp
 NAME OF FACILITY: 216 Paterson Plank Rd STE
 LOCATION: 216 Paterson Plank Rd Bridgewater
 NJDEPE PERMIT NO: 53623 OR ECRA CASE NO.: _____

CERTIFICATION

WELL PERMIT NUMBER(as assigned by NJDEPE) 26-44017
 OWNER'S WELL NUMBER(as shown on plan) MW14R
 WELL COMPLETION DATE 8-28-96
 DISTANCE FROM TOP OF CASING TO GROUND SURFACE 0
 DEPTH TO TOP OF SCREEN FROM TOP OF CASING 64.5'
 SCREEN LENGTH IN FEET 10' Open rock hole
 SCREEN OR SLOT SIZE _____
 SCREEN OR SLOT MATERIAL _____
 CASING MATERIAL(pvc, steel or other specify) 4" Sch 40 steel 64.5'
 CASING DIAMETER 8" x 8" steel 15' 10"
 STATIC WATER LEVEL 1.5
 YIELD GPM 1
 DEVELOPMENT TECHNIQUE sub pump
 LENGTH OF TIME WELL IS DEVELOPED 8 hrs. (PUMPED OR BAILED
 LITHOLOGIC LOG 0-4" Asphalt 7.5' - 13' Browns H
4-6' fill 13' - 28' grey clay
6' - 7.5' peat 28' - 44' red brown soil
44' - 74.5' silt stone

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Thomas Brown

NAME

[Signature]
 SIGNATURE

1311

CERTIFICATION OR LICENSE NO.

seal

CERTIFICATION BY EXECUTIVE OFFICER OR DULY AUTHORIZED REP

Dennis C. Moore

NAME

[Signature]
 SIGNATURE

General manager

TITLE

DATE

1-20-97

MONITORING WELL CERTIFICATION - "FORM A"

NAME OF PERMITTEE: 216 Paterson Plank Rd. Coop
NAME OF FACILITY: 216 Paterson Plank Rd site
LOCATION: 216 Paterson Plank Rd. Bergen City Rutherford Co
NJDEPE PERMIT NO: 53624 OR ECRA CASE NO.: _____

CERTIFICATION

WELL PERMIT NUMBER(as assigned by NJDEPE) 26-44012
OWNER'S WELL NUMBER(as shown on plan) MW150
WELL COMPLETION DATE 8-28-96
DISTANCE FROM TOP OF CASING TO GROUND SURFACE 0
DEPTH TO TOP OF SCREEN FROM TOP OF CASING 50'
SCREEN LENGTH IN FEET 2
SCREEN OR SLOT SIZE .010
SCREEN OR SLOT MATERIAL 304 stainless steel
CASING MATERIAL(pvc, steel or other specify) 8" steel
CASING DIAMETER 4" SS
STATIC WATER LEVEL 5'
YIELD GPM 1

DEVELOPMENT TECHNIQUE sub pump
LENGTH OF TIME WELL IS DEVELOPED 8 hrs. (PUMPED) OR BAILED
LITHOLOGIC LOG 0-6" top soil
6-10' fill sand 21'-47' grey clay
10'-13' gravel 47'-53.5' fill red br
13'-21" br sil 53.5'-58' sil stone

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Thomas Brown

NAME



SIGNATURE

1311

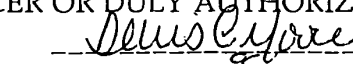
CERTIFICATION OR LICENSE NO.

seal

CERTIFICATION BY EXECUTIVE OFFICER OR DULY AUTHORIZED REP

Dennis C. Moore

NAME



SIGNATURE

General Manager

TITLE

12-10-96

DATE

MONITORING WELL CERTIFICATION - "FORM A"

NAME OF PERMITTEE: 216 Paterson Plunked Corp
NAME OF FACILITY: 216 Paterson Plunked Site
LOCATION: 216 Paterson Plunked, Bergen County, NJ
NJDEPE PERMIT NO: 53625 OR ECRA CASE NO.: _____

CERTIFICATION

WELL PERMIT NUMBER(as assigned by NJDEPE) 26-44021
OWNER'S WELL NUMBER(as shown on plan) MW16D
WELL COMPLETION DATE 8-28-96
DISTANCE FROM TOP OF CASING TO GROUND SURFACE 0
DEPTH TO TOP OF SCREEN FROM TOP OF CASING 3
SCREEN LENGTH IN FEET 5'
SCREEN OR SLOT SIZE 0.105101
SCREEN OR SLOT MATERIAL 304 Stainless Steel
CASING MATERIAL(pvc, steel or other specify) Sch 40 Steel 8" 20'
CASING DIAMETER 8" - 4"
STATIC WATER LEVEL 5
YIELD GPM 1
DEVELOPMENT TECHNIQUE Sub pump
LENGTH OF TIME WELL IS DEVELOPED 8 hrs PUMPED OR BAILED
LITHOLOGIC LOG 0-6" topsoil 11'-15' grey silt
6"-9" fill 15'-25' grey clay
9'-11' peat 25'-40' red silt
40'-45' silt stone

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Thomas Braun
NAME

Buller
SIGNATURE

4311
CERTIFICATION OR LICENSE NO.

seal

CERTIFICATION BY EXECUTIVE OFFICER OR DULY AUTHORIZED REP

Dennis C. Moore
NAME

Dennis C. Moore
SIGNATURE

General Manager
TITLE

12-13-96
DATE

MONITORING WELL CERTIFICATION - "FORM A"

NAME OF PERMITTEE: 216 Paterson Plank Rd Corp
NAME OF FACILITY: 216 Paterson Plank Rd site
LOCATION: 216 Paterson Plank Rd, Bergen Co, Rutgersland Blvd
NJDEPE PERMIT NO: 53623 OR ECRA CASE NO.: _____

CERTIFICATION

WELL PERMIT NUMBER(as assigned by NJDEPE) 26-44018
OWNER'S WELL NUMBER(as shown on plan) MW170
WELL COMPLETION DATE 8-28-96
DISTANCE FROM TOP OF CASING TO GROUND SURFACE 0
DEPTH TO TOP OF SCREEN FROM TOP OF CASING 45'
SCREEN LENGTH IN FEET 10'
SCREEN OR SLOT SIZE .010
SCREEN OR SLOT MATERIAL 304 Stainless Steel
CASING MATERIAL(pvc, steel or other specify) 8" steel
CASING DIAMETER 4" 5.5
STATIC WATER LEVEL 5.0
YIELD GPM 1
DEVELOPMENT TECHNIQUE sub pump
LENGTH OF TIME WELL IS DEVELOPED 8 hrs (PUMPED OR BAILED)
LITHOLOGIC LOG 0-4" Asphalt 7.5' brown silt & P/sand
4'-6" Pit 12-40' gray clay
6'-7.5' Red 40'-56' red brown till

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Thomas Brown
NAME

[Signature]
SIGNATURE

131
CERTIFICATION OR LICENSE NO.

seal

CERTIFICATION BY EXECUTIVE OFFICER OR DULY AUTHORIZED REP

Dennis C. Moore
NAME

[Signature]
SIGNATURE

General manager
TITLE

12-13-96
DATE

MONITORING WELL CERTIFICATION - "FORM A"

NAME OF PERMITTEE: 216 Paterson Plank Rd. Corp
NAME OF FACILITY: 216 Paterson Plank Rd. Site
LOCATION: 216 Paterson Plank Rd. Bergen Co., Rutherford Boro
NJDEPE PERMIT NO.: 53623 OR ECRA CASE NO.: _____

CERTIFICATION

WELL PERMIT NUMBER(as assigned by NJDEPE) 26-44019
OWNER'S WELL NUMBER(as shown on plan) MW18D
WELL COMPLETION DATE 8-28-96
DISTANCE FROM TOP OF CASING TO GROUND SURFACE 0
DEPTH TO TOP OF SCREEN FROM TOP OF CASING 61.5'
SCREEN LENGTH IN FEET 5'
SCREEN OR SLOT SIZE 10/0
SCREEN OR SLOT MATERIAL 304 stainless steel
CASING MATERIAL(pvc, steel or other specify) 304 stainless steel 8"
CASING DIAMETER 8"
STATIC WATER LEVEL 5.0
YIELD GPM 1
DEVELOPMENT TECHNIQUE Sub pump
LENGTH OF TIME WELL IS DEVELOPED 8 hrs PUMPED OR BAILED
LITHOLOGIC LOG 0-4' ASPHALT 7.5' 12.6' brown silt & sand
4.6' Frt 12.40' grey clay
6'-7.5' peat 40'-61' red brown

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Thomas Brown
NAME
1311

[Signature]
SIGNATURE

CERTIFICATION OR LICENSE NO. _____

seal

CERTIFICATION BY EXECUTIVE OFFICER OR DULY AUTHORIZED REP

Dennis C. Moore
NAME
General Manager
TITLE

[Signature]
SIGNATURE
12-13-96
DATE

Form B

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: 216 Paterson Plank Road Cooperating PRP Group
Name of Facility: 216 Paterson Plank Road Site
Location: 216 Paterson Plank Road, Carlstadt Boro, Bergen County
NJPDES Number: _____

LAND SURVEYOR'S CERTIFICATION

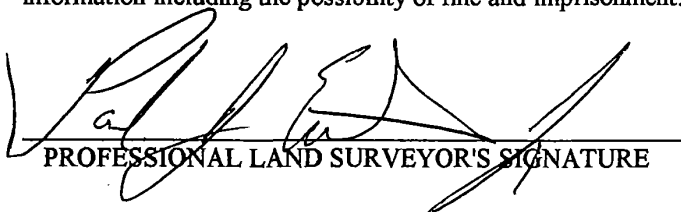
Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation): 26-44015
This number must be permanently affixed to the well casing.
Datum NAD 1927
Longitude (one-tenth of a second): West 74°04'11.57"
Latitude (one-tenth of a second): North 40°49'20.79"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): WC = 5.35 /IC = 5.11 /GRD = 5.35
Owners Well Number (As shown on application or plans): MW-8R

BENCHMARK - G.P.S. NETWORK **ELEVATION -** _____
GEOGRAPHIC POSITION - _____

DATE OF SURVEY - 9/23/96

AUTHENTICATION

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PROFESSIONAL LAND SURVEYOR'S SIGNATURE

Paul J. Emilius, Jr.
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

New Jersey P.L.S. License No. 37186
PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to be a major modification of the N.J.P.D.E.S. permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: 216 Paterson Plank Road Cooperating PRP Group
Name of Facility: 216 Paterson Plank Road Site
Location: 216 Paterson Plank Road, Carlstadt Boro, Bergen County
NJDES Number: _____

LAND SURVEYOR'S CERTIFICATION

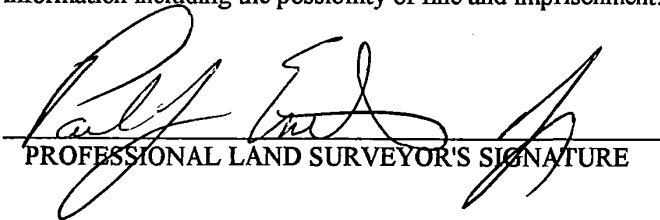
Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation): 26-44013
This number must be permanently affixed to the well casing.
Datum NAD 1927
Longitude (one-tenth of a second): West 74°04'21.21"
Latitude (one-tenth of a second): North 40°49'21.82"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): WC = 7.49 /IC = 7.09 /GRD = 7.49
Owners Well Number (As shown on application or plans): MW-10D

BENCHMARK - G.P.S. NETWORK **ELEVATION -** _____
GEOGRAPHIC POSITION - _____

DATE OF SURVEY - 9/23/96

AUTHENTICATION

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PROFESSIONAL LAND SURVEYOR'S SIGNATURE

Paul J. Emilius, Jr.
PROFESSIONAL LAND SURVEYOR'S NAME
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THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: 216 Paterson Plank Road Cooperating PRP Group
Name of Facility: 216 Paterson Plank Road Site
Location: 216 Paterson Plank Road, Carlstadt Boro, Bergen County
NJPDES Number: _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation): 26-44014

This number must be permanently affixed to the well casing.
Datum NAD 1927

Longitude (one-tenth of a second): West 74°04'21.12"

Latitude (one-tenth of a second): North 40°49'21.76"

Elevation of Top of Casing (cap off) (one-hundredth of a foot): WC = 7.48 /IC = 7.01 /GRD = 7.48

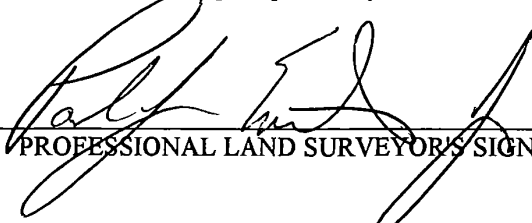
Owners Well Number (As shown on application or plans): MW-10R

BENCHMARK - G.P.S. NETWORK **ELEVATION -** _____
GEOGRAPHIC POSITION - _____

DATE OF SURVEY - 9/23/96

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.



PROFESSIONAL LAND SURVEYOR'S SIGNATURE

Paul J. Emilius, Jr.

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

New Jersey P.L.S. License No. 37186

PROFESSIONAL LAND SURVEYOR'S LICENSE #

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THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: 216 Paterson Plank Road Cooperating PRP Group
Name of Facility: 216 Paterson Plank Road Site
Location: 216 Paterson Plank Road, Carlstadt Boro, Bergen County
NJPDES Number: _____

LAND SURVEYOR'S CERTIFICATION

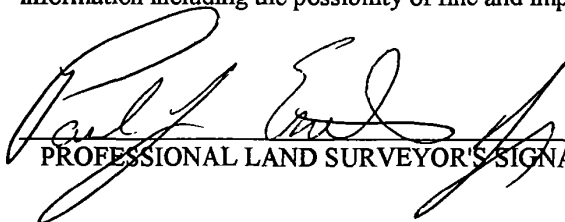
Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation): 26-44020
This number must be permanently affixed to the well casing.
Datum NAD 1927
Longitude (one-tenth of a second): West 74°04'23.26"
Latitude (one-tenth of a second): North 40°49'25.17"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): WC = 6.41 /IC = 8" 6.25 IC 4"=6.19 GRD=6.41
Owners Well Number (As shown on application or plans): MW-11R

BENCHMARK - G.P.S. NETWORK **ELEVATION -** _____
GEOGRAPHIC POSITION - _____

DATE OF SURVEY - 9/19/96

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.



PROFESSIONAL LAND SURVEYOR'S SIGNATURE

Paul J. Emilius, Jr.

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

New Jersey P.L.S. License No. 37186

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THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: 216 Paterson Plank Road Cooperating PRP Group
Name of Facility: 216 Paterson Plank Road Site
Location: 216 Paterson Plank Road, Carlstadt Boro, Bergen County
NJPDES Number: _____

LAND SURVEYOR'S CERTIFICATION

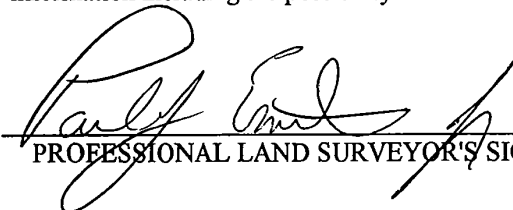
Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation): 26-44016
This number must be permanently affixed to the well casing.
Datum NAD 1927
Longitude (one-tenth of a second): West 74°04'16.45"
Latitude (one-tenth of a second): North 40°49'27.27"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): WC 2.45 /IC8" = 2.38 IC 4"= 2.19 GRD=2.45
Owners Well Number (As shown on application or plans): MW-14D

BENCHMARK - G.P.S. NETWORK **ELEVATION -** _____
GEOGRAPHIC POSITION - _____

DATE OF SURVEY - 9/19/96

AUTHENTICATION

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PROFESSIONAL LAND SURVEYOR'S SIGNATURE

Paul J. Emilius, Jr.

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

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New Jersey P.L.S. License No. 37186

PROFESSIONAL LAND SURVEYOR'S LICENSE #

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THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: 216 Paterson Plank Road Cooperating PRP Group
Name of Facility: 216 Paterson Plank Road Site
Location: 216 Paterson Plank Road, Carlstadt Boro, Bergen County
NJDES Number: _____

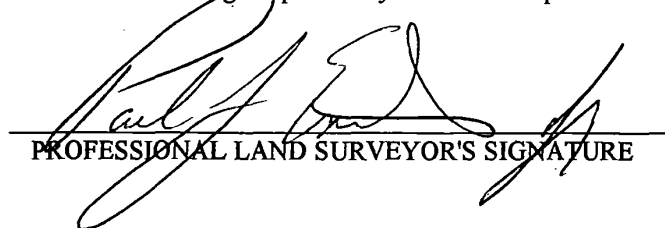
LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation): 26-44017
This number must be permanently affixed to the well casing.
Datum NAD 1927
Longitude (one-tenth of a second): West 74°04'16.36"
Latitude (one-tenth of a second): North 40°49'27.23"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): WC = 2.37 /IC = 2.22 /GRD = 2.37
Owners Well Number (As shown on application or plans): MW-14R

BENCHMARK - G.P.S. NETWORK **ELEVATION -** _____
GEOGRAPHIC POSITION - _____
DATE OF SURVEY - 9/19/96

AUTHENTICATION

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PROFESSIONAL LAND SURVEYOR'S SIGNATURE

Paul J. Emilius, Jr.
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

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New Jersey P.L.S. License No. 37186
PROFESSIONAL LAND SURVEYOR'S LICENSE #

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THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: 216 Paterson Plank Road Cooperating PRP Group
Name of Facility: 216 Paterson Plank Road Site
Location: 216 Paterson Plank Road, Carlstadt Boro, Bergen County
NJPDES Number: _____

LAND SURVEYOR'S CERTIFICATION

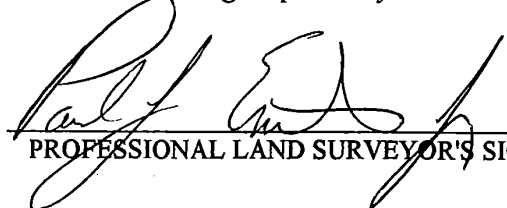
Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation): 26-44012
This number must be permanently affixed to the well casing.
Datum NAD 1927
Longitude (one-tenth of a second): West 74°04'27.71"
Latitude (one-tenth of a second): North 40°49'26.33"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): WC = 9.68 / IC = 9.47 / GRD = 9.68
Owners Well Number (As shown on application or plans): MW-15D

BENCHMARK - G.P.S. NETWORK **ELEVATION -** _____
GEOGRAPHIC POSITION - _____

DATE OF SURVEY - 9/23/96

AUTHENTICATION

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PROFESSIONAL LAND SURVEYOR'S SIGNATURE

Paul J. Emilius, Jr.

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

New Jersey P.L.S. License No. 37186

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THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: 216 Paterson Plank Road Cooperating PRP Group
Name of Facility: 216 Paterson Plank Road Site
Location: 216 Paterson Plank Road, Carlstadt Boro, Bergen County
NJPDES Number: _____

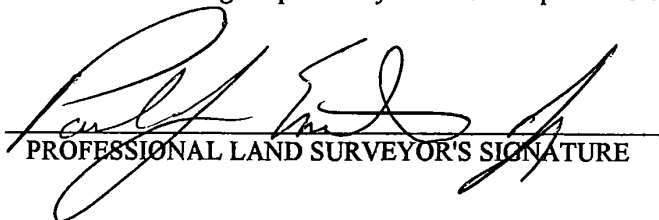
LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation): 26-44021
This number must be permanently affixed to the well casing.
Datum NAD 1927
Longitude (one-tenth of a second): West 74°04'23.12"
Latitude (one-tenth of a second): North 40°49'28.71"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): WC = 7.58 /IC = 8" 7.50 IC 4"=6.59 GRD=7.25
Owners Well Number (As shown on application or plans): MW-16D

BENCHMARK - G.P.S. NETWORK **ELEVATION -** _____
GEOGRAPHIC POSITION - _____
DATE OF SURVEY - 9/19/96

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.


PROFESSIONAL LAND SURVEYOR'S SIGNATURE

Paul J. Emilius, Jr.
PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

New Jersey P.L.S. License No. 37186
PROFESSIONAL LAND SURVEYOR'S LICENSE #

The Department reserves the right in cases of violation of permit specified ground water limits or Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et seq.) to require that wells be resurveyed to an accuracy of one-hundredth of a second latitude and longitude. This shall not be considered to be a major modification of the N.J.P.D.E.S. permit.

THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: 216 Paterson Plank Road Cooperating PRP Group
Name of Facility: 216 Paterson Plank Road Site
Location: 216 Paterson Plank Road, Carlstadt Boro, Bergen County
NJPDES Number: _____

LAND SURVEYOR'S CERTIFICATION

Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation): 26-44018

This number must be permanently affixed to the well casing.

Datum NAD 1927

Longitude (one-tenth of a second): West 74°04'11.44"

Latitude (one-tenth of a second): North 40°49'20.95"

Elevation of Top of Casing (cap off) (one-hundredth of a foot): WC = 5.05 /IC = 4.75 /GRD = 5.05

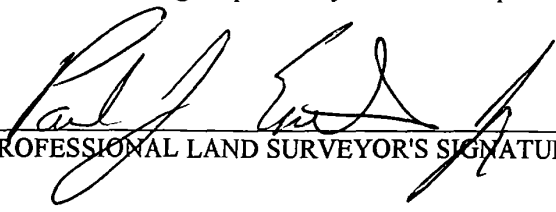
Owners Well Number (As shown on application or plans): MW-17D

BENCHMARK - G.P.S. NETWORK **ELEVATION -** _____
GEOGRAPHIC POSITION - _____

DATE OF SURVEY - 9/23/96

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.



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Paul J. Emilius, Jr.

PROFESSIONAL LAND SURVEYOR'S NAME
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THIS FORM MUST BE COMPLETED BY THE PERMITTEE OR HIS/HER AGENT

GROUND WATER MONITORING WELL CERTIFICATION - FORM B - LOCATION CERTIFICATION

Name of Permittee: 216 Paterson Plank Road Cooperating PRP Group
Name of Facility: 216 Paterson Plank Road Site
Location: 216 Paterson Plank Road, Carlstadt Boro, Bergen County
NJPDES Number: _____

LAND SURVEYOR'S CERTIFICATION

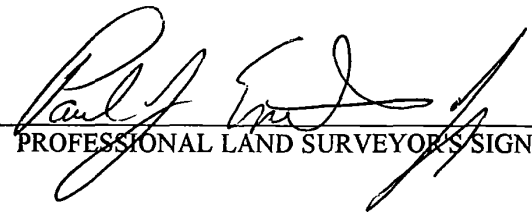
Well Permit Number (As assigned by NJDEP's Bureau of Water Allocation): 26-44019
This number must be permanently affixed to the well casing.
Datum NAD 1927
Longitude (one-tenth of a second): West 74°04'11.50"
Latitude (one-tenth of a second): North 40°49'20.86"
Elevation of Top of Casing (cap off) (one-hundredth of a foot): WC = 5.23 /IC = 4.51 /GRD = 5.23
Owners Well Number (As shown on application or plans): MW-18D

BENCHMARK - G.P.S. NETWORK **ELEVATION -** _____
GEOGRAPHIC POSITION - _____

DATE OF SURVEY - 9/23/96

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.



PROFESSIONAL LAND SURVEYOR'S SIGNATURE

Paul J. Emilius, Jr.

PROFESSIONAL LAND SURVEYOR'S NAME
(Please print or type)

SEAL

New Jersey P.L.S. License No. 37186

PROFESSIONAL LAND SURVEYOR'S LICENSE #

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APPENDIX C
Well Development Forms



WELL DEVELOPMENT FIELD RECORD

JOB NAME SCP Carbant
 DEVELOPED BY S. Mitchell
 STARTED DEVEL. 8/22/96 1 0940
 DATE TIME
 W.L. BEFORE DEVEL. +0.4' 18/12/161 0920
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. 41.5 feet
 STANDING WATER COLUMN (FT.) 41.5'
 SCREEN LENGTH 5.0 feet

JOB NO. 943-6222 WELL NO. MW-10D
 DATE OF INSTALL. _____ SHEET 1 OF 5
 COMPLETED DEVEL. 8/26/96 1 1534
 DATE TIME
 AFTER DEVEL. 10.05 18/12/161 0740
 DEPTH DATE TIME
 AFTER DEVEL. 42.0 ^{feet} WELL DIA. (in) 4.0
 STANDING WELL VOLUME 27 gal.
 DRILLING WATER LOSS 0 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				Turbidity OTHER	REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)			
8/22/96 10940							Surge with Surge block for 5 minutes
0954							Pump well with 3" Submersible to remove Sediment
0954	23						Well Pumped to near dryness (water level at +1 at well screen)
1106							Well recovered only 3.5 feet
1109		1140	83.5	10.10	655		Begin Pumping @ 191m
1112	26	6890	80.1	11.90	off-scale		Very turbid - dark reddish brown
1114							Well Pumped to near dryness
1254							Surge well with Surge block for 5 minutes. Pump well with 3" Pump - Added water, Surged, Pumped several times to expedite development - Well yield is < 0.1 gpm
1602							Begin Pumping at 0.3 gpm
1602	26.5	1470	88.5	9.98	350		Slightly turbid
1606	27.5	1010	81.8	9.90	221		" "
1608	28.0	1180	82.3	10.35	178		" "
		= TOTAL VOLUME REMOVED (gal.)					

DEVELOPMENT METHOD:

Grundfos Submersible Pump / Surge Block / Water Injection
 Well Recovery Very Slow (a yield < 0.1 gpm) - used water to help with development -
 Water introduced in the well was immediately removed. A combination of Pumping and Surging
 with a surge block was used for well Development. Approximately 99 gallons of water
 was removed (excluding the water added to aid development)

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME SCP Carbostat
 DEVELOPED BY S. Mitchell
 STARTED DEVEL. 8/22/96 1 0940
 DATE TIME
 W.L. BEFORE DEVEL. 1 1
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. _____
 STANDING WATER COLUMN (FT.) _____
 SCREEN LENGTH _____

JOB NO. 943-6222 WELL NO. MW-10D
 DATE OF INSTALL. _____ SHEET 2 OF 5
 COMPLETED DEVEL. 1
 DATE TIME
 AFTER DEVEL. 1 1
 DEPTH DATE TIME
 AFTER DEVEL. _____ WELL DIA. (in) _____
 STANDING WELL VOLUME _____ gal.
 DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER NTU	
8/22/96 / 1610	28.5	1490	83.9	10.77	145	Cloudy
1612						Pump rate 0.2 gpm
1613	29.0	1970	86.4	10.99	134	
1616	29.5	2120	88.0	11.09	132	
1622	30.5	2420	90.0	11.10	135	Cloudy
1625	31.0	2460	91.2	11.13	141	Cloudy
1629	32.0	-	91.2	11.15	142	Cloudy
1630						Stopped Pumping
1640						Total Depth of Well 42.0' bgs
						- removed 0.5' of sediment
8/23/96 / 0745						Total Depth of Well 42.0' bgs
						Depth to water 19.2' bgs
0814						Surge Well with Surge Block for 5 minutes
0824						Begin pumping @ 0.2 gpm
0825	0.2	2180	78.5	11.16	64	
0828	0.6	2270	76.9	11.37	164	Cloudy
0838	2.6	1520	78.4	11.12	618	Turbid - reddish-brown
0848	4.6	1550	79.2	10.84	1032	Turbid - " "
		= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: _____

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME Scr Carb test.
 DEVELOPED BY S. Mitchell
 STARTED DEVEL. 8/22/96 1 0944
 DATE TIME
 W.L. BEFORE DEVEL. 1 1
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. _____
 STANDING WATER COLUMN (FT.) _____
 SCREEN LENGTH _____

JOB NO. 943-6222 WELL NO. MW-10D
 DATE OF INSTALL. _____ SHEET 3 OF 5
 COMPLETED DEVEL. 1
 DATE TIME
 AFTER DEVEL. 1 1
 DEPTH DATE TIME
 AFTER DEVEL. _____ WELL DIA. (In) _____
 STANDING WELL VOLUME _____ gal.
 DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER NTU	
8/25/96 1058	6.6	1630	80.2	10.80	795	Turbid - reddish brown
1078	8.6	1780	80.1	10.85	451	" "
0918	10.6	1990	80.7	10.89	362	
0938	14.6	2080	83.6	11.01	144	Cloudy
0940						Pump off. Surge well with
						Surge Block for 10 minutes
1042						Basin pumping @ 0.2 gpm
1043	14.8	2260	87.9	10.92	off-scale	
1048	15.8	1770	82.1	10.77	1087	Turbid - reddish brown
1055	17.0	1960	81.5	10.70	960	
1104	18.8	1990	88.7	10.91	949	Turbid - reddish brown
1113	20.5					Pumping rate 0.4 gpm
1114	21.0	1910	88.3	10.82	954	
1115	21.4	1980	88.3	10.89	930	Turbid - reddish brown
1117	22.0	1990	88.6	10.90	—	Pump shut off - well near dry
1334						Basin pumping @ 0.5 gpm
1335	22.5	2220	99.2	10.73	670	Turbid - reddish brown
1340	25.0	1450	85.0	10.69	318	Slightly turbid
1345	26.5	1760	85.6	10.70	228	
= TOTAL VOLUME REMOVED (gal.)						

DEVELOPMENT METHOD: _____

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME SCP Carbost
 DEVELOPED BY S. Mitchell
 STARTED DEVEL. 8/22/96 1 0144
 DATE TIME
 W.L. BEFORE DEVEL. 1 1
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. _____
 STANDING WATER COLUMN (FT.) _____
 SCREEN LENGTH _____

JOB NO. 943-6222 WELL NO. MW-100
 DATE OF INSTALL. _____ SHEET 4 OF 5
 COMPLETED DEVEL. 1
 DATE TIME
 AFTER DEVEL. 1 1
 DEPTH DATE TIME
 AFTER DEVEL. _____ WELL DIA. (in) _____
 STANDING WELL VOLUME _____ gal.
 DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER	
8/23/96 1346	28.0	2040	88.6	10.88	177	Cloudy
1348	29.0	2330	93.0	10.96	170	"
1351	30.5	2410	93.9	10.99	126	"
1355	32.5	2430	94.4	11.01	138	"
1400	35.0					Pump shut. off. Well near dryness
8/26/96 10854						Total Depth of well 41.80' bss
						Depth to water 8.30' bss
0855						Surge well with surge block for 10 minutes
0944						Begin pumping @ 0.4 gpm
0945	0.4	1340	73	11.17	418	Very turbid - reddish brown
0947						Pumping rate 0.3 gpm
0948	2.0	1250	73.4	11.50	371	Very turbid - reddish brown
0952	3.2	1390	77.2	11.50	569	Turbid
0957	4.4	1460	80.6	11.33	1084	"
1005	6.8	1580	82.7	11.31	783	"
1013	9.0	1580	83.0	11.53	310	Slightly turbid, reddish brown
1027	13.0	1700	83.6	11.51	249	
= TOTAL VOLUME REMOVED (gal.)						

DEVELOPMENT METHOD: _____

NOTES:

WELL DEVELOPMENT FIELD RECORD

JOB NAME SLT (w/1st)†
DEVELOPED BY S. Mitchell
STARTED DEVEL. 8/22/76 1 07:00
DATE TIME
W.L. BEFORE DEVEL. 1 1
DEPTH DATE TIME
WELL DEPTH: BEFORE DEVEL. _____
STANDING WATER COLUMN (FT.) _____
SCREEN LENGTH _____

JOB NO. 943 6222 WELL NO. MW-10D
DATE OF INSTALL. _____ SHEET 5 OF 5
COMPLETED DEVEL. 1

DATE TIME
AFTER DEVEL. 1 1

DEPTH DATE TIME
AFTER DEVEL. _____ WELL DIA. (In) _____
STANDING WELL VOLUME _____ gal.
DRILLING WATER LOSS _____ gal.

[illegible]

DEVELOPMENT METHOD:

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME Scr Carlstadt
 DEVELOPED BY S. Mitchell
 STARTED DEVEL. 8/27/96 1 0905
 DATE TIME
 W.L. BEFORE DEVEL. 7.25' 18/27/96 0845
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. 65.6'
 STANDING WATER COLUMN (FT.) 58.4'
 SCREEN LENGTH 10'

JOB NO. 943-6222 WELL NO. MW-10R
 DATE OF INSTALL. _____ SHEET 1 OF 3
 COMPLETED DEVEL. 8/28/96 1 1530
 DATE TIME
 AFTER DEVEL. 6.80 18/28/96 1 0731
 DEPTH DATE TIME
 AFTER DEVEL. _____ WELL DIA. (in) 2.0 Cas. in 4"
 STANDING WELL VOLUME 38.0 gal. h.w.
 DRILLING WATER LOSS 400 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER	
8/27/96/0905						Basin Pumping @ 1.0 gpm
0907	2.0	490	67.7	8.90	off-scale	Very turbid - reddish brown
						Pump shut-off due to too much silt
0910						Pump on - Pumping @ 0.7 gpm
0915	5.5	470	71.1	7.38	off-scale	Very turbid - reddish brown
0929	15.0	510	73.4	9.00	339	" "
0956	34.0	570	71.7	8.44	840	" "
1000						Pumping rate @ 1.8 gpm
1129	194	620	72.7	7.61	305	Slightly turbid
1138						Pumping rate @ 1.0 gpm
1145	213	660	74.2	8.00	168	Cloudy
1235	263	710	74.1	8.08	751	Turbid - reddish brown
1255	283	680	74.1	8.04	85	Cloudy
1258						Pumping rate @ 1.2 gpm
						Pumping rate increased to 1.4 gpm @ 1302
✓ 1308	300	680	72.2	8.04	56	Clear
✓ 1338	320	700	71.6	8.20	71	Cloudy
= TOTAL VOLUME REMOVED (gal.)						

DEVELOPMENT METHOD: Submersible Pump
 Modified Redman Well - see Well Construction Detail - Total Amount removed was 805 gallons - 2 times the amount of water loss during Rock Coring

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME SCP Contract
 DEVELOPED BY S. Mitchell
 STARTED DEVEL. 8/27/96 1 0905
 DATE TIME
 W.L. BEFORE DEVEL. 7.25 18/27/96 0845
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. _____
 STANDING WATER COLUMN (FT.) _____
 SCREEN LENGTH _____

JOB NO. 943-6222 WELL NO. MW-10R
 DATE OF INSTALL. _____ SHEET 2 OF 3
 COMPLETED DEVEL. 1
 DATE TIME
 AFTER DEVEL. 1 1
 DEPTH DATE TIME
 AFTER DEVEL. _____ WELL DIA. (In) _____
 STANDING WELL VOLUME _____ gal.
 DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER NTU	
8/27/96 / 1354	325	690	72.1	8.52	54	Clear
1400	328	710	73.2	8.33	132	Cloudy
1500	350	730	73.7	8.21	61	Clear
1550	370	730	73.6	8.33	19	Clear
1600	380	720	72.2	8.41	19	"
1601						Pump Shut-off
8/28/96 / 0813						Depth to water 7.40'
						Surged well for 5 minutes with Grubbs pump.
0850						Began pumping @ 1.2 gpm
0851	1.2	580	65.2	9.19	912	Very turbid. redish brown
0901	13.0	630	66.6	8.96	283	Slightly turbid
0911	25.0	630	69.1	9.08	108	Cloudy
0921	37.0	640	69.0	9.07	53	Clear
1017	130	690	70.0	8.53	13.2	Pumping rate 1.5 gpm - Clear
1024	155	700	73.3	8.53	8.0	Clear
1104	180	730	73.2	8.05	9.0	Clear
1110	185	710	65.8	7.83	918	lowered pump 5' from bottom
1130	205	730	73.3	8.18	118	Cloudy
= TOTAL VOLUME REMOVED (gal.)						

DEVELOPMENT METHOD: _____

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME <u>SCP Carlstast</u>	JOB NO. <u>943-6222</u> WELL NO. <u>MW-10R</u>
DEVELOPED BY <u>S. Mitchell</u>	DATE OF INSTALL. _____ SHEET <u>3</u> OF <u>3</u>
STARTED DEVEL. <u>1</u>	COMPLETED DEVEL. <u>1</u>
DATE TIME	DATE TIME
W.L. BEFORE DEVEL. <u>1</u> <u>1</u>	AFTER DEVEL. <u>1</u> <u>1</u>
DEPTH DATE TIME	DEPTH DATE TIME
WELL DEPTH: BEFORE DEVEL. _____	AFTER DEVEL. _____ WELL DIA. (in) _____
STANDING WATER COLUMN (FT.) _____	STANDING WELL VOLUME _____ gal.
SCREEN LENGTH _____	DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP (°F)	pH (s.u.)	Turbidity OTHER NTU	
8/28/96 / 1235	260	730	73.4	8.25	16	Clear
1355						Well Surged w/ Pump
1402	355	770	74.7	8.35	975	Turbid. reddish brown
1418	375	760	74.5	7.84	232	Stagnant, turbid
1435	390	760	75.2	8.10	19	Clear
1445	400	750	75.0	8.26	27	Clear
1455	405	740	73.3	8.43	32	Clear
1511	410	770	72.8	8.23	15.9	Clear
1521	420	780	74.1	8.26	12	Clear
1527	425	780	73.9	8.26	13	Clear
1530						Pump shut off
= TOTAL VOLUME REMOVED (gal.)						805

DEVELOPMENT METHOD: _____

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME Carlkest - SCP
 DEVELOPED BY Stuart Mitchell
 STARTED DEVEL. 8/8/96 1 0843
 DATE TIME
 W.L. BEFORE DEVEL. 51.69' 18/8/96 1 0830
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. 57.0 bgs
 STANDING WATER COLUMN (FT.) 51.32
 SCREEN LENGTH 9.0 feet (Open Borehole)

JOB NO. 913-6222 WELL NO. Mh-11R
 DATE OF INSTALL. 8/1/96 SHEET 1 OF 3
 COMPLETED DEVEL. 8/8/96 1 1552
 DATE TIME
 AFTER DEVEL. 6.0' 18/8/96 1 1551
 DEPTH DATE TIME
 AFTER DEVEL. 57.0 bgs WELL DIA. (in) 3.5
 STANDING WELL VOLUME 32.0 gal.
 DRILLING WATER LOSS 500 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS					REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity NTU	OTHER	
8/8/96 / 0843	Initial readings	1420	67.5	11.62	40.3		Begin Pumping @ ~2.14 gpm
" 0854	24	658	67.7	11.16	21.5		Water Sample Clear
" 0857							Increase pumping rate to ~2.75 gpm
" 0904	47	553	67.7	10.93	20.0		Water Sample Clear
" 0917	82	595	68.4	10.90	8.0		
" 0920							Increase pumping rate to ~3.2
" 0929	119	640	67.7	10.76	7.8		Water Sample Clear
" 0939	151	712	67.4	10.63	5.93		Water Sample Clear
" 0949	183	751	67.4	10.43	5.4		Water Sample Clear
" 0952							Increase pumping rate to ~4.0 gpm
" 0959	221	791	67.2	10.27	11.70		Water Sample Clear
" 1009	261	850	66.7	10.03	4.9		"
" 1019	301	917	66.0	9.84	4.8		"
" 1029	341	989	66.8	9.72	4.7		"
" 1039	381	1140	66.8	9.59	3.8		"
" 1049	421	1170	67.4	9.44	2.8		"
" 1059	461	1200	66.2	9.37	1.9		"
" 1100							Stop Pumping to Empty Water Tank
" 1138							Begin Pumping @ 4.0 gpm
✓		= TOTAL VOLUME REMOVED (gal.)					

DEVELOPMENT METHOD: Grout for Submersible Pump - Approximately 2.5
times the volume of water loss was removed. Development completed as per
USEPA Oversight (ICF Kaiser).

NOTES: Well is open Borehole



WELL DEVELOPMENT FIELD RECORD

JOB NAME Curbish - SCP
 DEVELOPED BY Stuart Mitchell
 STARTED DEVEL. 8/8/96 1 0843
 DATE TIME
 W.L. BEFORE DEVEL. 5.68' 18/8/96 1 0830
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. 57.0 bgs
 STANDING WATER COLUMN (FT.) 51.32
 SCREEN LENGTH 9.0 feet (open borehole)

JOB NO. 943-6222 WELL NO. MW-11R
 DATE OF INSTALL. 8/11/96 SHEET 2 OF 3
 COMPLETED DEVEL. 8/8/96 1 1552
 DATE TIME
 AFTER DEVEL. 6.0' 18/8/96 1 1551
 DEPTH DATE TIME
 AFTER DEVEL. 57.0 bgs WELL DIA. (in) 3.5
 STANDING WELL VOLUME 32.0 gal.
 DRILLING WATER LOSS 500 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER NTU	
8/8/96 / 1139	501	1280	70.3	9.58	2.8	Water Sample Clear
1149	541	1250	68.0	9.38	1.8	"
1159	581	1260	67.4	9.33	2.3	"
1209	621	1290	68.4	9.30	2.1	"
1219	661	1310	67.5	9.25	1.9	"
1234	721	1370	68.2	9.17	1.8	"
1244	761	1370	68.9	9.13	1.8	"
1254	801	1380	69.4	9.10	1.5	"
1304	841	1390	68.2	9.05	1.6	"
1314	881	1420	68.7	9.03	1.4	"
1324	921	1410	68.4	8.94	1.0	"
1334	961	1430	69.4	8.96	0.9	
1334						Stopped Pumping to Empty Tank
1438						Began Pumping @ 4.0 gpm
1440	968	1480	72.2	9.12	1.6	Water Sample Clear
1450	1008	1420	69.8	9.0	1.2	"
1500	1048	1400	69.9	8.98	1.2	"
1510	1088	1450	71.0	8.96	1.0	"
1520	1128	1470	70.5	8.89	0.9	"
		= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: _____

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME Carlstadt - SCP
 DEVELOPED BY S. Mitchell / M. E. Eber
 STARTED DEVEL. 7/29/96 1 / 000
 DATE TIME
 W.L. BEFORE DEVEL. 1.0' 17/29/96 0920
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. 38.85'
 STANDING WATER COLUMN (FT.) 37.85
 SCREEN LENGTH 10 feet

JOB NO. 943-6222 WELL NO. MW-14D
 DATE OF INSTALL _____ SHEET 1 OF 4
 COMPLETED DEVEL. 7/31/96 1 / 054
 DATE TIME
 AFTER DEVEL. _____
 DEPTH DATE TIME
 AFTER DEVEL. _____ WELL DIA. (in) 4.0
 STANDING WELL VOLUME 24.60 gal.
 DRILLING WATER LOSS 0.0 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity (NTU)	
7/29/96 / 0954						Begin Pumping @ 2.5 gpm
1000	2.0	2380	71.5	12.12	609	Cloudy
1019	40					Pump rate decreased to 1.0 gpm
1020	72					Surge well with surge block for 5 minutes
1043						Begin pumping at rate of 2.5 gpm
1046	49					Well pumped dry
1306						Begin Pumping @ 1.0 gpm
						@ 1309 reduce pumping rate to 0.25 gpm - Note after 12 hrs well only recovered 10 feet.
1310	52	3100	72.8	12.20	1097	
1315	54				1037	
1319	53	2910	71.8	12.20	1093	
1322	56	3120	71.2	12.24	902	Cloudy - light reddish brown.
1326	57				683	
1328	57.5					Stop Pumping - Well almost dry
1418						Surge well with surge block for 5 minutes
✓ 1428						Resume Pumping @ 0.25 gpm
= TOTAL VOLUME REMOVED (gal.)						Note - After 1 hr well only recovered 5 feet.

DEVELOPMENT METHOD: Combination of Submersible Pump + Surge Block
Total amount removed 138 gallons (~ 6.0 Well Volumes)

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME <u>Carltest / SCP</u> DEVELOPED BY _____ STARTED DEVEL. <u>1</u> DATE TIME W.L. BEFORE DEVEL. <u>1</u> <u>1</u> DEPTH DATE TIME WELL DEPTH: BEFORE DEVEL. _____ STANDING WATER COLUMN (FT.) _____ SCREEN LENGTH _____	JOB NO. _____ WELL NO. <u>MW-14D</u> DATE OF INSTALL. _____ SHEET <u>3</u> OF <u>4</u> COMPLETED DEVEL. <u>1</u> DATE TIME AFTER DEVEL. <u>1</u> <u>1</u> DEPTH DATE TIME AFTER DEVEL. _____ WELL DIA. (in) _____ STANDING WELL VOLUME _____ gal. DRILLING WATER LOSS _____ gal.
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DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°C)	pH (S.U.)	Turbidity OTHER NTU	
7/31/96 0900						D.T.W 7.14 feet
0917		1664	67.1	12.45	33.7	Start pumping at 2 1/2 gpm
0921						D.T.W 10.06 @ 2 1/2 gpm
0955	15.0					D.T.W 15' 2" @ 2 1/2 gpm
1001		2250	69.5	12.60	44.0	D.T.W 17.11' @ 2 1/2 gpm
						-Surge well - Pump off
1015		2100	69.0	12.57	44.3	Restart Pump @ 2 1/2 gpm
1025						D.T.W 21.05
1030		2520	70.5	12.66	119	
1032	21.0					D.T.W 22.60
1056	33	2990	71.0	12.84	93.1	Well almost dry - Stop pumping
1215						Surge Well
1214						Resume pumping
1232	43.0					Well almost dry
1243						D.T.W 38.5' - well recovering
1303						D.T.W 34.75 ~ 0.15 cpm recharge
7/31/96 0955						D.T.W 6.0'
1005						Start pumping @ 0.25 gpm
1034		1604	70.5	12.57	22.1	
		= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: _____

NOTES:

WELL DEVELOPMENT FIELD RECORD

JOB NAME Carlstadt
DEVELOPED BY M. Elsner
STARTED DEVEL. 7/23/61
DATE TIME
W.L. BEFORE DEVEL. 2.261 7/23 1430
DEPTH DATE TIME
WELL DEPTH: BEFORE DEVEL. 64.0'
STANDING WATER COLUMN (FT.) 61.74'
SCREEN LENGTH 10'

JOB NO. 943-6222 WELL NO. MW-14 R
DATE OF INSTALL. 7/23/96 SHEET 1 OF 1
COMPLETED DEVEL. 7/23/96 1653
DATE TIME
AFTER DEVEL. 1 1
DEPTH DATE TIME
AFTER DEVEL. WELL DIA. (In) 4
STANDING WELL VOLUME 40.3 gal.
DRILLING WATER LOSS 0 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				Turbidity NTU OTHER	REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (C)	pH (s.u.)			
7-23/1520	100	1011	67.7	8.73	2.11		
7-23/1551	160	1078	66.2	10.23	8.96		
7-23/1622	220	1083	65.2	7.56	7.47		
7-23/1637	270	1099	66.8	7.66	5.01		
7-23/1653	290	1103	66.5	8.03	4.55	Tank Full	

DEVELOPMENT METHOD: Submersible 2" pump
pumped ≈ 80 gal at 4 gpm
then reduced rate to ≈ 1.5 gpm for next 50 gal
then flow rate moved to 2.3 gpm

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME SCP Carlstast
 DEVELOPED BY S.M. Tchur
 STARTED DEVEL. 8/19/96 1 / 05⁴
 DATE TIME
 W.L. BEFORE DEVEL. 5.8' 18/19/96 1034
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. 49.9' bgs
 STANDING WATER COLUMN (FT.) 44.10
 SCREEN LENGTH 2 feet

JOB NO. 943-6222 WELL NO. MW-15D
 DATE OF INSTALL. _____ SHEET 1 OF 7
 COMPLETED DEVEL. 8/21/96 1 / 05³
 DATE TIME
 AFTER DEVEL. 9.50' 18/22/96 0936
 DEPTH DATE TIME
 AFTER DEVEL. 52.2' WELL DIA. (In) 4.0
 STANDING WELL VOLUME 29.0 gal.
 DRILLING WATER LOSS 0 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (S.U.)	Turbidity / OTHER NTU	
<u>8/19/96</u> / <u>1054</u>						Surge well with surge block
<u>1140</u>						for 5 minutes
<u>1142</u>	<u>1.2</u>	<u>2230</u>	<u>90.1</u>	<u>12.39</u>	<u>off-scale</u>	Begin Pumping @ 0.6 gpm
<u>1146</u>	<u>6.0</u>	<u>2260</u>	<u>80.1</u>	<u>12.35</u>	<u>off-scale</u>	Very turbid - dark reddish brown
<u>1150</u>						
<u>1151</u>	<u>6.3</u>	<u>2340</u>	<u>77.1</u>	<u>12.25</u>	<u>386</u>	Adjust Pumping rate to 0.3 gpm
<u>1154</u>						Water sample cloudy
<u>1200</u>	<u>10.0</u>	<u>2230</u>	<u>75.1</u>	<u>12.54</u>	<u>645</u>	Pumping rate 0.5 gpm
<u>1207</u>	<u>12.0</u>					Slightly turbid
<u>1226</u>	<u>14.0</u>	<u>2170</u>	<u>78.3</u>	<u>12.51</u>	<u>150</u>	Pump cut-off
<u>1234</u>	<u>20.4</u>	<u>2170</u>	<u>78.7</u>	<u>12.56</u>	<u>79</u>	Begin Pumping @ 0.8 gpm
<u>1240</u>	<u>27.0</u>					Slightly cloudy
<u>1410</u>						Pump cut-off - Problems with pump
<u>8/20/96</u> / <u>0830</u>						Pump not operable - Depth of well
<u>1410</u>						49.9' bgs
<u>8/20/96</u> / <u>0830</u>						Total Depth of Well - 49.50' bgs -
<u>1410</u>						Depth to water 12.60' bgs
<u>1410</u>						Surge well with surge block for 5 minutes
		= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: Grundfos Submersible pump / Surge Block / Sand bucket / Water injection / Bailor
Bailor Sand bucket + water injection used to remove approximately 2.3 feet of Sediment from
bottom of well. A combination of pumping with a 2" Grundfos Submersible Pump
and Surging with a Surge block was used for the well development. Approximately 222
gallons of water was removed during development (~ 2.5 Well Volumes).

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME SCP Carb test
 DEVELOPED BY S. Mitchell
 STARTED DEVEL. 8/19/96 1 1054
 DATE TIME
 W.L. BEFORE DEVEL. 1 1
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. _____
 STANDING WATER COLUMN (FT.) _____
 SCREEN LENGTH _____

JOB NO. 943-6222 WELL NO. MW-15D
 DATE OF INSTALL. _____ SHEET 2 OF 7
 COMPLETED DEVEL. 1
 DATE TIME
 AFTER DEVEL. 1 1
 DEPTH DATE TIME
 AFTER DEVEL. _____ WELL DIA. (in) _____
 STANDING WELL VOLUME _____ gal.
 DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER NTU	
8/20/96 / 0912						Begin pumping @ 0.5 gpm
0913	0.5	3240	71.1	12.11	off-scale	Very turbid - dark reddish brown
0920	4.0	3540	70.2	12.10	off-scale	Surging well while pumping
						- Very turbid - dark reddish brown
0922						Pumping rate adjusted to 0.3 gpm
0926	6.0	3610	70.4	12.75	off-scale	
0932	8.0	3420	72.5	12.65	1069	Turbid - reddish brown
0946						Surging well while pumping
0947	12.5	2830	68.7	12.20	1120	
0953	14.0					Stop Pumping
1004						Surge well with surge blown for - 8 minutes
1010						Begin pumping @ 0.5 gpm
1012	15.0	3070	78.3	11.19	1092	Turbid
1015	16.5	2640	62.5	10.00	off-scale	Very turbid - dark reddish brown
						- Adjust flow rate to 0.6 gpm
1020	19.5	2820	58.7	9.59	289	Turbid
1021						Flow rate 0.5 gpm
✓ 1025	23.0	2690	55.90	9.00	454	Turbid - Flow rate 0.3 gpm
= TOTAL VOLUME REMOVED (gal.)						

DEVELOPMENT METHOD: _____

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME <u>SCP Carlstast</u> DEVELOPED BY <u>S. Mitchell</u> STARTED DEVEL. <u>1</u> DATE TIME W.L. BEFORE DEVEL. <u>1</u> <u>1</u> DEPTH DATE TIME WELL DEPTH: BEFORE DEVEL. _____ STANDING WATER COLUMN (FT.) _____ SCREEN LENGTH _____	JOB NO. <u>943-6222</u> WELL NO. <u>MW-15D</u> DATE OF INSTALL. _____ SHEET <u>3</u> OF <u>7</u> COMPLETED DEVEL. <u>1</u> DATE TIME AFTER DEVEL. <u>1</u> <u>1</u> DEPTH DATE TIME AFTER DEVEL. _____ WELL DIA. (In) _____ STANDING WELL VOLUME _____ gal. DRILLING WATER LOSS _____ gal.
--	--

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (C/F)	pH (s.u.)	Turbidity OTHER NTU	
8/20/96 11035	26.0	3560	51.0	8.35	off-scale	-lowered pump 5' - water sample very turbid (muddy)
						- flow rate 0.5 gpm
1437	27.5					Stopped Pumping - flow too thick for pump. Use 3" bailer to remove sediment
1252	42.0					- removed 15' gallery with bailer
						Total Depth of Well Now 50.5' bgs
						Still 1.5' of sediment - Dec. to well with pot still water
1413						Begin flushing with potable water - Use
						Combination of flushing + pumping
1504						Stopped Pumping - Injected ~ 50 gallon
						approximately 60 gallon - No water loss in formation
						- Begin bailing with 3" bailer - remove
	50.0					8 gallon
✓ 1557						Total Depth of Well 50.8' bgs
= TOTAL VOLUME REMOVED (gal.)						

DEVELOPMENT METHOD: _____

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME SCP (Arbiter)
 DEVELOPED BY S. Mitchell
 STARTED DEVEL. 1
 DATE TIME
 W.L. BEFORE DEVEL. 1 1
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. _____
 STANDING WATER COLUMN (FT.) _____
 SCREEN LENGTH _____

JOB NO. 943-6222 WELL NO. MW-150
 DATE OF INSTALL. _____ SHEET 4 OF 7
 COMPLETED DEVEL. 1
 DATE TIME
 AFTER DEVEL. 1 1
 DEPTH DATE TIME
 AFTER DEVEL. _____ WELL DIA. (in) _____
 STANDING WELL VOLUME _____ gal.
 DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER NTU	
8/21/96 / 0835						Total Depth of well 50.7' bgs -
						Depth to water 9.45' bgs
0900						Use sand bucket to remove
						sediment
0932	15					Total Depth of well 52.2' - all
						sediment has been removed
0940	33					Inject 3" Submersible - Surge Well
						to remove drilling fluid - Pump
						18 gallons - Pump well to near
						dryness
1020	41					Surge Well with Pump - Pump
						8.0 gallons
1125						Surge Well with Surge blow for
						5 minutes - Begin Pumping with
						Grout #1 @ 0.4 gpm
1132	42.0	2850	58.3	7.84	391	Cloudy
1137	43.5	2360	60.1	7.64	261	Cloudy
1147	47.5	2810	58.3	7.85	127	Slightly Cloudy
1157	52.5	2130	59.0	8.25	90	Clear
= TOTAL VOLUME REMOVED (gal.)						

DEVELOPMENT METHOD: _____

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME SCP Carlstat.

JOB NO. 943-6222 WELL NO. ML-15D

DEVELOPED BY S. Mitchell

DATE OF INSTALL. _____ SHEET 5 OF 7

STARTED DEVEL. 1

COMPLETED DEVEL. 1

DATE TIME

DATE TIME

W.L. BEFORE DEVEL. 1 1

AFTER DEVEL. 1 1

DEPTH DATE TIME

DEPTH DATE TIME

WELL DEPTH: BEFORE DEVEL. _____

AFTER DEVEL. _____ WELL DIA. (in) _____

STANDING WATER COLUMN (FT.) _____

STANDING WELL VOLUME _____ gal.

SCREEN LENGTH _____

DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER	
8/21/96 / 1159						Surge well with surge block - while pumping
1207	57.0	2820	63.8	7.13	175	
1217		2920	68.7	7.12	138	Slightly cloudy
1242	67.0	3160	68.4	7.51	31	Clear
1252	71.0	3210	70.1	7.50	21	Clear
1302	75.0	3200	71.9	7.28	21	Clear
1306	76.5					Surge well with surge block - while pumping
1312	79.0	3410	72.9	7.53	721	Cloudy
1322	83.0	3480	74.2	7.52	85	Slightly cloudy
1332	87.0	3390	74.2	7.49	32	Clear
1342	91.0	3600	72.0	7.51	13.4	Clear
1352	95.0	3500	70.4	7.44	9.14	Clear
1402	99.0	3600	71.8	7.44	7.21	Clear
1406	100.5					Surge well with surge block - while pumping
1412	103.0	3550	72.0	7.17	1087	
✓ 1416	104.5					Pumping rate 0.6 gpm
		= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: _____

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME SCP Carbtest
 DEVELOPED BY S Mitchell
 STARTED DEVEL. 1
 DATE TIME
 W.L. BEFORE DEVEL. 1 1
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. _____
 STANDING WATER COLUMN (FT.) _____
 SCREEN LENGTH _____

JOB NO. 943-6222 WELL NO. MW-15D
 DATE OF INSTALL. _____ SHEET 6 OF 7
 COMPLETED DEVEL. 1
 DATE TIME
 AFTER DEVEL. 1 1
 DEPTH DATE TIME
 AFTER DEVEL. _____ WELL DIA. (In) _____
 STANDING WELL VOLUME _____ gal.
 DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				Turbidity OTHER NTU	REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)			
8/21/76 1420							Pump shut-off
1530							Begin Pumping @ 0.4 gpm
1533	106.0	4610	58.2	5.21	21.4		Cloudy
1543	110	3470	59.4	7.52	22.4		Clear
1553	114	3480	59.8	7.43	12.9		Clear
1603	118	3590	59.7	7.39	9.80		Clear
1610	120.5	3380	60.1	7.41	6.0		Clear
1611							Pump rate increased to 0.6 gpm
1612							Surge well with surge block catch
							Pumping well for 5 minutes
1617	125.0	3380	60.0	7.45	18.6		Slightly turbid - reddish brown
1627	131.0	3360	60.0	7.51	6.6		Cloudy
1631	133.5	3390	59.9	7.48	23		Slightly Cloudy
1636	136.0	3380	60.1	7.50	9.5		Clear
1641	139.0	3360	60.1	7.52	16.9		
1646	142.0	3350	59.2	7.48	6.28		Clear
1648	143	—	—	—	6.12		Clear
✓ 1649	143.5	—	—	—	6.09		Clear
✓ 1650	144.0	—	—	—	2.77		Clear
= TOTAL VOLUME REMOVED (gal.)							

DEVELOPMENT METHOD: _____

NOTES:



JOB NO. 943-6222 WELL NO. MW-15D
DATE OF INSTALL. _____ SHEET 7 OF 7
COMPLETED DEVEL. 8/21/96 1 1653
DATE TIME
AFTER DEVEL. 9.50 18/12/96 0936
DEPTH DATE TIME
AFTER DEVEL. 52.2 ' WELL DIA. (In) 4.0
STANDING WELL VOLUME _____ gal.
DRILLING WATER LOSS _____ gal.

DEVELOPMENT METHOD: _____

R2-0000427



WELL DEVELOPMENT FIELD RECORD

JOB NAME Carltest - SCP
 DEVELOPED BY Stuart Mitchell
 STARTED DEVEL. 8/1/96 1 0948
 DATE TIME
 W.L. BEFORE DEVEL. 5.87' 18/1/96 0910
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. 35.10'
 STANDING WATER COLUMN (FT.) 29.23
 SCREEN LENGTH 5.0

JOB NO. 943-6222 WELL NO. MW-16D
 DATE OF INSTALL. _____ SHEET 1 OF 3
 COMPLETED DEVEL. 8/1/96 1 1428
 DATE TIME
 AFTER DEVEL. 8.13' 18/1/96 1428
 DEPTH DATE TIME
 AFTER DEVEL. 35.10 WELL DIA. (in) 4.0
 STANDING WELL VOLUME 19.0 gal.
 DRILLING WATER LOSS 0.0 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER NTU	
8/1/96 / 0948	—	4650	69.0	11.65	off-scale	Initial Reading - Pump rate ~1.0 gpm
0956	7.0	4550	65.3	6.42	282	Water Sample slightly turbid - reddish brown
1002	13.0	2880	65.4	6.46	949	Water Sample very turbid - reddish brown
1008	19.0	1990	66.6	6.42	657	Water Sample Turbid - reddish brown
1015	26.0	1730	66.8	6.43	758	"
1017	28.0					— Stop Pumping - Surge Well
						With Surge block for 5 minutes
1030						— Begin Pumping @ 1.0 gpm
1031	29.0	2170	70.3	6.44	890	Very turbid - reddish brown
1036	34.0	3130	67.0	6.43	off-scale	"
1041	39.0	2280	65.2	6.19	1010	"
1046	44.0	1980	65	6.28	500	Turbid - reddish brown
1051	49.0	1890	65.5	6.33	190	Slightly turbid
1056	54.0	1850	65.8	6.28	81	Clear
1100	58.0					Stopped Pumping - Surge Well
						With Surge block for 5 minutes
1133	58.0	2560	73.5	6.56	475	Begin Pumping @ 1.0 gpm
1138	63.0	2920	67.7	15.75	off-scale	Very turbid - reddish brown
1145	68.0	2360	67.1	6.28	1010	"
= TOTAL VOLUME REMOVED (gal.)						

DEVELOPMENT METHOD: Submersible Pump / Surge Block
Surged Well a total of 3 times for a total of ~ 19 minutes - Pumped a total of ~ 205 gallons (~ 11 well volumes) - Development Complete as per USFA Oversight (JCF Kaiser).

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME Carlstat - SCP
 DEVELOPED BY Steve Mitchell
 STARTED DEVEL. 8/1/96 1 0947
 DATE TIME
 W.L. BEFORE DEVEL. 5.87' 18/1/96 1 0910
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. 35.10'
 STANDING WATER COLUMN (FT.) 29.23
 SCREEN LENGTH 5.0

JOB NO. 943-6222 WELL NO. MLN-161D
 DATE OF INSTALL. _____ SHEET 2 OF 3
 COMPLETED DEVEL. 8/1/96 1 1128
 DATE TIME
 AFTER DEVEL. 8.13' 18/1/96 1 1428
 DEPTH DATE TIME
 AFTER DEVEL. 35.10 WELL DIA. (in) 4.0
 STANDING WELL VOLUME 19.0 gal.
 DRILLING WATER LOSS 0.0 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				Turbidity OTHER NTU	REMARKS
		SPEC. COND. (umhos/cm)	TEMP. 66.3 F	pH (S.U.)			
8/1/96 / 1148	73.0	1960	66.3	6.39	681	Turbid. (red)ish brown	
1153	78.0	1840	66.5	6.47	242	Slightly turbid	
1158	83.0	1840	66.5	6.47	131	"	
1205	88.0	1830	66.3	6.49	73	Clear	
1208	93.0	1830	65.7	6.50	61	"	
1213	98.0	1770	65.6	6.50	48	"	
1218	103	1830	66.1	6.51	33	"	
1223	108	1700	66.0	6.49	26	"	
1224	109					Stopped pumping - Surge well	
						With Surge Block for 7 minutes	
1233						Began pumping @ 1.0 gpm	
1235	111	1820	71.9	6.50	58	Clear	
1240	116	2100	67.3	6.51	561	Very turbid. (red)ish brown	
1245	121	1850	67.8	6.51	980	"	
1250	126	1720	67.8	6.49	289	Turbid. reddish brown	
1255	131	1710	68.6	6.43	113	"	
1300	136	1780	68.4	6.41	62		
1305	141	1990	69.9	6.34	46		
1310	146	1880	70.9	6.31	56		
✓		= TOTAL VOLUME REMOVED (gal.)					

DEVELOPMENT METHOD: _____

NOTES:

WELL DEVELOPMENT FIELD RECORD

JOB NAME Carlstant - SCP

DEVELOPED BY Stuart Mitchell

STARTED DEVEL. 8/1/96 1 094P

	DATE	TIME
W.L. BEFORE DEVEL.	<u>5.87'</u>	<u>1 8/1/96 1 0910</u>
	DEPTH	DATE TIME
WELL DEPTH: BEFORE DEVEL.	<u>35.10'</u>	
STANDING WATER COLUMN (FT.)	<u>29.23</u>	
SCREEN LENGTH	<u>5.0</u>	

JOB NO. 973-6222 WELL NO. M/W-161D

DATE OF INSTALL. _____ SHEET 3 OF 3

COMPLETED DEVEL. 8/1/96 1/1/28

DATE TIME

AFTER DEVEL. 8/15 18/1/96 1/28

DEPTH DATE TIME

AFTER DEVEL. 35.10 WELL DIA. (In) 4.0

STANDING WELL VOLUME 19.0 gal.

DRILLING WATER LOSS 0.0 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. °F	pH (S.U.)	Turbidity OTHER NTU	
8/196 / 1315	151	1920	71.8	6.29	43	
1320	156	1860	70.9	6.3	37	
1321	157					Staged Pumping - Surge Well
						with surge block for 7 minutes
1340						Basin Pumping @ 1.0 gpm
1342	159	2010	80.3	6.40	236	
1347	164	2140	71.0	6.37	920	Very turbid - reddish brown.
1352	169	1830	70.6	6.35	361	
1357	174	1790	69.9	6.30	13-1	Slightly turbid .
1402	179	1780	70.5	6.28	95	
1407	184	1860	71.0	6.25	62	
1412	189	1800	70.6	6.31	40	
1421	198	1760	70.3	6.30	33	
1426	203	1710	70.6	6.32	38	
1428	205					Turned Pump off
V ↓						
		- TOTAL VOLUME REMOVED (gal.)	205			

DEVELOPMENT METHOD:

NOTES:

WELL DEVELOPMENT FIELD RECORD

JOB NAME Caldwell - SCP
DEVELOPED BY M. Elsner / S. mitcher
STARTED DEVEL. 7/16/96 1127
DATE TIME
W.L. BEFORE DEVEL. 2.45 17/16/96 1056
DEPTH DATE TIME
WELL DEPTH: BEFORE DEVEL. 54.8'
STANDING WATER COLUMN (FT.) 52.0
SCREEN LENGTH 10 feet

JOB NO. 913-6222 WELL NO. MW-17D
 DATE OF INSTALL. _____ SHEET 1 OF 4
 COMPLETED DEVEL. 8/9/96 1 / 1528
 DATE TIME
 AFTER DEVEL. 11.72 18/9/96 1 / 1528
 DEPTH DATE TIME
 AFTER DEVEL. 54.8' WELL DIA. (In) 4.0
 STANDING WELL VOLUME 35 gal.
 DRILLING WATER LOSS 0.0 gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER NTU	
7/11/96 1251	35	1425	65	6.05	700	Pumping Rate 2 2.0 gpm Pumped dry @ 50 gpm - 1300
						Lower flow rate + resume @ 1305
1340	70	1290	65	6.23	83.6	Purge rate 2 0.8 gpm
1413	105	3060	70.3	5.77	314	Purge rate 2 12 gpm
Switch 2H meter						
1447	140	2840	66.7	6.52	54.3	Purge rate 2 1.3 gpm
1450						Stop Pumping - Surge well with Surge block for 2 10 minutes
1511						Resume Pumping
						Pump ran dry @ 1523 Restart @
						Pump ran dry @ 1527
						Restart @ 1530 (raise Pump 6")
1543	175	2850	66.6	7.09	183.0	Surge well for 6 minutes with Surge Block
8/1/96 1515						
1533						Begin Pumping well @ 1.4 gpm
1534	1.0	2870	73.4	16.29	off-scale	
		= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: Submersible Pump / Surge Block
Total of 453 gallons removed (\approx 13 Well Volumes) - Development Complete as per
USEPA oversight (TCE Manager)

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME Carlisle / SCP
 DEVELOPED BY M. Elmer / S. Mitchell
 STARTED DEVEL. 7/16/96 1 12/8
 DATE TIME
 W.L. BEFORE DEVEL. 1 1
 DEPTH DATE TIME
 WELL DEPTH: BEFORE DEVEL. _____
 STANDING WATER COLUMN (FT.) _____
 SCREEN LENGTH _____

JOB NO. 943-6222 WELL NO. MLW-17D
 DATE OF INSTALL. _____ SHEET 2 OF 4
 COMPLETED DEVEL. 1
 DATE TIME
 AFTER DEVEL. 1 1
 DEPTH DATE TIME
 AFTER DEVEL. _____ WELL DIA. (in) _____
 STANDING WELL VOLUME _____ gal.
 DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. °F	pH (s.u.)	Turbidity OTHER NTU	
8/1/96 / 1538	5.0	2850	76.8	6.28	off-scale	
1541	8.0	3100	79.0	6.21	306	Very turbid - reddish brown
1547	14.0	3180	79.0	6.2	1027	
1553						Pumping rate = 0.75 gpm
1554	21.0	3180	80.0	6.25	1063	
1600	25.0	3280	80.0	6.27	720	
1605	29.0	3290	81.5	6.37	680	
1610	33.0	3270	79.8	6.42	526	Turbid reddish brown
1620	37.0	2880	78.5	6.28	479	
1625	41.0	2890	77.8	6.25	420	
1627	42.0					Pump shut-off - Surge well
1638	43.0	3190	84.7	6.29	628	With Surge 6100 ft. 5 minutes
1643	43.5	2890	79.4	6.24	off-scale	Resume Pumping @ 2.05 gpm
1648	46.0	2810	78.7	6.26	172	Very turbid - reddish brown
1653	48.5	2840	78.5	6.24	907	Very turbid - reddish brown
1658	52.0	2860	79.0	6.21	1032	Increase pumping rate to 2.08 gpm
1703	56.0	2940	77.4	6.25	886	
1706	58.5	2920	77.3	6.27	823	
		= TOTAL VOLUME REMOVED (gal.)				

DEVELOPMENT METHOD: _____

NOTES:

WELL DEVELOPMENT FIELD RECORD

JOB NAME Cartblast - SCP
DEVELOPED BY M. P. Isaac / S. Mitchell
STARTED DEVEL. 7/16/86 1 1218
DATE TIME

W.L. BEFORE DEVEL. / / .

DEPTH DATE TIME

WELL DEPTH: BEFORE DEVEL.

STANDING WATER COLUMN (FT.)

SCREEN LENGTH

JOB NO. 9436222 WELL NO. MW-17D

DATE OF INSTALL. SHEET 3 OF 4

COMPLETED DEVL. _____ / _____
DATE TIME

AFTER DEVEL. / /

AFTER DEVEL.	WELL DIA. (In)
1	10
2	10
3	10
4	10
5	10
6	10
7	10
8	10
9	10
10	10
11	10
12	10
13	10
14	10
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16	10
17	10
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84	10
85	10
86	10
87	10
88	10
89	10
90	10
91	10
92	10
93	10
94	10
95	10
96	10
97	10
98	10
99	10
100	10

STANDING WELL VOLUME gal.

DRILLING WATER LOSS gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				Turbidity OTHER NTU	REMARKS
		SPEC. COND. (umhos/cm)	TEMP. 10 F	pH (s.u.)			
8/1/96 / 1710	62.0	2930	76.4	6.26	685		
1714	65.0	2980	78.6	6.26	627		
1718	68.0	2810	76.3	6.23	499	Cloudy	
1724	71.0	2780	75.8	6.26	413		
1727	74.5	2740	75.8	6.23	370		
1733	78.0	2800	75.4	6.24	260	Pump shut off.	
8/9/96 / 1011						Surge went w/ Surge Block for 5 minutes	
1020						Begin pumping @ 1.0 gpm	
1025	5.0	2810	70.2	7.57	365	Cloudy	
1032						Adjust Flow rate to 0.9 gpm	
1035	15.0	2840	69.1	7.77	217	Cloudy	
1040	19.5	2850	71.0	7.30	126	Cloudy	
1045	23.5	2970	71.5	7.32	128	Cloudy	
1055	27.5	3190	73.5	7.29	80	Cloudy	
1105	36.0	3040	70.4	7.32	108	"	
1115	45.0	3040	70.0	7.34	77	Slightly cloudy	
1125	54.0	3040	70.3	6.81	82	"	
1135	63.0	3090	70.3	7.12	43	Clear	
		= TOTAL VOLUME REMOVED (gal.)					

DEVELOPMENT METHOD:

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME Carlsbad - SCP
 DEVELOPED BY M. Fisher / S. M. J. J.
 STARTED DEVEL. 7/16/96 1 12/8
 DATE TIME

JOB NO. 943-6222 WELL NO. MW-17D
 DATE OF INSTALL. _____ SHEET 4 OF 4
 COMPLETED DEVEL. _____ 1
 DATE TIME

W.L. BEFORE DEVEL. _____ 1 1
 DEPTH DATE TIME

AFTER DEVEL. _____ 1 1
 DEPTH DATE TIME

WELL DEPTH: BEFORE DEVEL. _____

AFTER DEVEL. _____ WELL DIA. (in) _____

STANDING WATER COLUMN (FT.) _____

STANDING WELL VOLUME _____ gal.

SCREEN LENGTH _____

DRILLING WATER LOSS _____ gal.

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°F)	pH (s.u.)	Turbidity OTHER NTU	
8/9/96 / 1145	72.0	3150	69.9	7.26	40	Clear
1155	81.0	3150	70.0	7.24	24	Clear
1202	87.0					Stop Pumping - Surge Well w/ Surge block for 5 minutes
1334						Resume Pumping @ 1.0 gpm
1336	89.0	2900	69.0	7.19	55	Very turbid - reddish brown
1341	94.0	2910	67.7	7.66	241	"
1348	101	2940	67.0	7.54	1042	Slightly turbid - reddish brown
1349						Pumping rate 0.9 gpm
1358	110	2920	67.5	7.62	305	
1415	125	2890	67.0	7.60	189	Cloudy
1425	134	2870	67.0	7.43	101	Slightly cloudy
1427						Pumping rate 1.0 gpm
1435	144	2860	67.0	7.35	77	Clear
1445	154	2870	67.0	7.37	54	"
1455	164	2870	67.2	7.36	37	"
1505	174	2850	67.4	7.35	35	"
1515	184	2840	67.9	7.35	23	"
1528	200					Pump turned off
		= TOTAL VOLUME REMOVED (gal.) 453				

DEVELOPMENT METHOD: _____

NOTES:



WELL DEVELOPMENT FIELD RECORD

JOB NAME <u>Calstart - SCP</u> DEVELOPED BY <u>M. Ebn / S. M. Icheil</u> STARTED DEVEL. <u>7/24/96 1 1140</u> DATE TIME W.L. BEFORE DEVEL. <u>2.40 17/24/96 1135</u> DEPTH DATE TIME WELL DEPTH: BEFORE DEVEL. <u>66.5</u> STANDING WATER COLUMN (FT.) <u>64.1</u> SCREEN LENGTH <u>5 feet</u>	JOB NO. <u>943-6222</u> WELL NO. <u>MW-18D</u> DATE OF INSTALL. _____ SHEET <u>1</u> OF <u>1</u> COMPLETED DEVEL. <u>7/30/96 1 1539</u> DATE TIME AFTER DEVEL. <u>3.27 18/24/96 0950</u> DEPTH DATE TIME AFTER DEVEL. <u>66.50</u> WELL DIA. (in) <u>4</u> STANDING WELL VOLUME <u>42.3</u> gal. DRILLING WATER LOSS _____ gal.
---	--

DATE/TIME	VOLUME REMOVED (GALS)	FIELD PARAMETERS				REMARKS
		SPEC. COND. (umhos/cm)	TEMP. (°C) <u>5</u>	pH (s.u.)	Turbidity OTHER NTU	
<u>7/24/96 1 1140</u>						Begin Pumping at ~ 1.0 gpm -
						Push Pumping + Surging well with
						Surge Block at same time
<u>1235</u>	<u>55</u>	<u>3130</u>	<u>77.1</u>	<u>6.77</u>	<u>1000</u>	
<u>1331</u>	<u>110</u>	<u>3130</u>	<u>76.7</u>	<u>7.47</u>	<u>670</u>	
<u>1446</u>	<u>175</u>	<u>3020</u>	<u>71.6</u>	<u>8.30</u>	<u>470</u>	
<u>7/30/96 1 1429</u>		<u>1700</u>	<u>65.0</u>	<u>8.28</u>	<u>174</u>	Begin Pumping @ 8.0 gpm
<u>1432</u>	<u>24.0</u>	<u>1610</u>	<u>63.1</u>	<u>8.35</u>	<u>408</u>	
<u>1434</u>	<u>41.0</u>				<u>1170</u>	-Well went dry
<u>1459</u>						Resume Pumping @ ~ 1.7 gpm
<u>1501</u>	<u>43.5</u>	<u>2930</u>	<u>70.4</u>	<u>8.0</u>	<u>122</u>	
<u>1512</u>	<u>45.0</u>	<u>2900</u>	<u>69.3</u>	<u>7.76</u>	<u>198</u>	
<u>1506</u>						Pump malfunctioned
<u>1515</u>						Resume Pumping @ ~ 1.7 gpm
<u>1518</u>	<u>50.0</u>	<u>2840</u>	<u>68.7</u>	<u>8.40</u>	<u>556</u>	
<u>1524</u>	<u>58.5</u>	<u>2510</u>	<u>69.0</u>	<u>8.0</u>	<u>587</u>	Cloudy - light reddish brown
<u>1531</u>	<u>67.0</u>				<u>511</u>	
<u>1535</u>	<u>74.0</u>	<u>2610</u>	<u>68.1</u>	<u>8.2</u>	<u>463</u>	
<u>1539</u>	<u>81.0</u>	<u>2520</u>	<u>69.2</u>	<u>7.94</u>	<u>814</u>	Note: Well almost dry - reason for
= TOTAL VOLUME REMOVED (gal.) <u>256</u>						i. increase in turbidity

DEVELOPMENT METHOD: Submersible Pump / Surge Block

Total of ~ 256 gallons of water removed from well during development (Approx 6.0 Well Volumes). First 3 hrs of development well was developed by Pumping + Surging Well. Development Complete as per USEPA Oversight Contractor (USEPA).

NOTES:

APPENDIX D

Hydrogeologic Testing Procedures, Data, and Results

Hydrologic Testing

Introduction

Hydrogeologic testing was conducted in accordance with the Final Work Plan Amendment (Work Plan; Golder Associates, 1995) for the 216 Paterson Plank Road Site (Site) in Carlstadt, NJ. Hydrogeologic Testing was performed in all of the wells installed during the Off-Property Investigation (Investigation). Slug tests were performed in wells MW-10D, MW-10R and MW-14D through MW-18D, and packer tests were performed in wells MW-8R, MW-11R and MW-14R. The testing program was performed to provide information regarding the hydraulic conductivity of the till and the bedrock in the vicinity of the site.

This section describes the equipment used, testing procedures, data collection methods, and data analysis procedures. Results and interpretations of the data are contained in Section 4.2 of the report text.

Packer Testing

Packer Testing Set-up

The packer testing in MW-8R was completed using a double packer assembly with three pressure transducers to monitor hydraulic head conditions above (T1), below (T3) and within each test section (T2). The packer assembly consists of a pair of inflatable rubber cylinders separated by a section of perforated steel pipe. The packer testing in bedrock wells MW-11R and MW-14R were completed using a single packer assembly (the same assembly as described above minus the bottom packer). When the packers are inflated, a test zone within the corehole is isolated hydraulically from the rest of the corehole. Water is then allowed to flow from or into the test zone via the perforated pipe, and under controlled conditions. This is referred to as the "flow" portion of the test. The packer tool was equipped with a downhole shut-in valve to allow an instantaneous change of pressure within the test zone.

The hydraulic heads in the test section, above the top packer and below the bottom packer were monitored using pressure transducers. The pressure transducers were connected to a datalogger which recorded the head values. The heads were recorded every three seconds during early stages of the test when the head in the test zone was changing rapidly. The recording interval was gradually increased to a maximum of thirty minutes.

The length of the test interval ranged from 9.6 feet to 16.0 feet for testing in MW-8R and 10.0 feet for testing in MW-11R and MW-14R.

Borehole Drill Stem Packer Testing Procedures

The general packer testing procedure was conducted as follows:

- Lower the packer assembly to the required depth;
- Start recording the pressure transducer values with the datalogger;
- Inflate the packers using compressed nitrogen;
- Measure the stable water level inside the drill rod (i.e., the potentiometric level of the test zone) and close the shut-in valve;
- Pump water out of the drill rods in preparation for a rising head test;
- Open the shut-in valve allowing water in the aquifer to enter the test section and the drill rods;
- Monitor the change in hydraulic head with time ("flow" testing);
- Close the downhole shut-in valve to initiate the "shut-in recovery" testing;
- When the pressures in the transducers have stabilized to their pre-testing values, stop the datalogger;
- Open the downhole shut-in valve and deflate the packers; and,
- Download the data from the datalogger to a portable computer and insert the data into an Excel spreadsheet for analysis.

Packer Testing Analysis Methods

The data obtained from the flow portion of the packer tests were analyzed using the Hvorslev (1951) method (U.S. Department of the Navy, 1982). Hvorslev developed a method for the determination of horizontal hydraulic conductivity using measured values of head difference (y) versus time (t). The methodology of data analysis requires the plotting of head ratio (percentage of head yet to recover, y/y_o) on the vertical scale of semi-log paper versus time (t) on the linear horizontal scale. The steps required for the analysis are summarized below. A more detailed description of the analysis method is contained in Hvorslev, 1951.

Step 1:

Plot y_t/y_o (logarithmic) versus t in a semilogarithmic format. Note: y_o is the initial head difference and is equal to $h_o - h$.

Step 2:

Because y_t and t are the only variables in the equations, the plot must show a straight line (this is usually between 50 percent and 90 percent recovery). In other words, the straight line portion is the valid part of the readings, and the curved part of the plot may be due to wellbore storage, skin or boundary effects which are not accounted for.

Step 3:

Select two points on the straight line portion of the curve and record their coordinates (t_1, y_{t1}) and (t_2, y_{t2}). Record the other test specific parameters (i.e. well coring radius, test section length, etc.).

Step 4:

Use the equation below to calculate the horizontal hydraulic conductivity (K):

$$K = \frac{r_c^2}{2L} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where:

- K = hydraulic conductivity [cm/s]
- r_c = casing radius [feet]
- R_e = equivalent radius [feet]
- L_e = length of screened interval [feet]
- t = time [seconds]
- h_t = hydraulic head at time t [feet]

Slug Testing

Rising head slug tests were performed on the wells screened in the till and bedrock monitoring well MW-10R. As discussed in Section 3.2 of the report, due to poor quality of bedrock encountered in MW-10R (low rock quality designation (RQD)), the installation of 2"-stainless steel well screen and riser was necessary precluding the use of packer testing at this location. The slug of water for

all tests was removed using a Grundfos RediFlow 2 centrifugal pump. Water removed from the wells was contained in 55-gallon drums and transported to the on-Site 10,000 gallon holding tank for subsequent off-Site disposal.

The water elevations in the wells were measured using an In-Situ SP2000 TROLL transducer/datalogger. The datalogger was programmed to record the water levels in a "logarithmic" method in which the time interval between measurements was very small (0.2 seconds) at the beginning of the test and gradually increased to a maximum time interval of 30 seconds after 5 minutes of recording. Using this recording scheme, sufficient early time data was recorded to capture rapid changes in water levels without collecting excessive late-time data.

The general procedure for slug testing was as follows:

- Measure the static water level was using and electronic water level indicator prior to inserting the datalogger/transducer into the well;
- Place the datalogger/transducer in the well;
- Input the initial static water level into the datalogger/transducer as a reference elevation;
- Insert the pump into the well and turn it on.
- When the pump runs dry, shut the valve at the outlet of the pump, start the datalogger, and shut off the pump;
- When the water level in the well reached the level at the beginning of the test, stop the datalogger; and,
- Download the data from the datalogger using a portable computer and insert the data into an Excel spreadsheet for analysis.

The slug tests were analyzed using the modified Hvorslev (1951) method (U.S. Department of Navy, 1982). Results and interpretations of the data are contained in Section 4.2. A brief description of the analysis method was included in the previous section.

REFERENCES

Hvorslev, M.J., 1951, "Time Lag and Soil Permeability in Groundwater Observations", Bulletin 36, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi.

U.S. Department of the Navy, 1982, "Soil Mechanics, Design Manual 7.1," Department of the Navy, Naval Facilities and Engineering Command, Alexandria, Virginia.

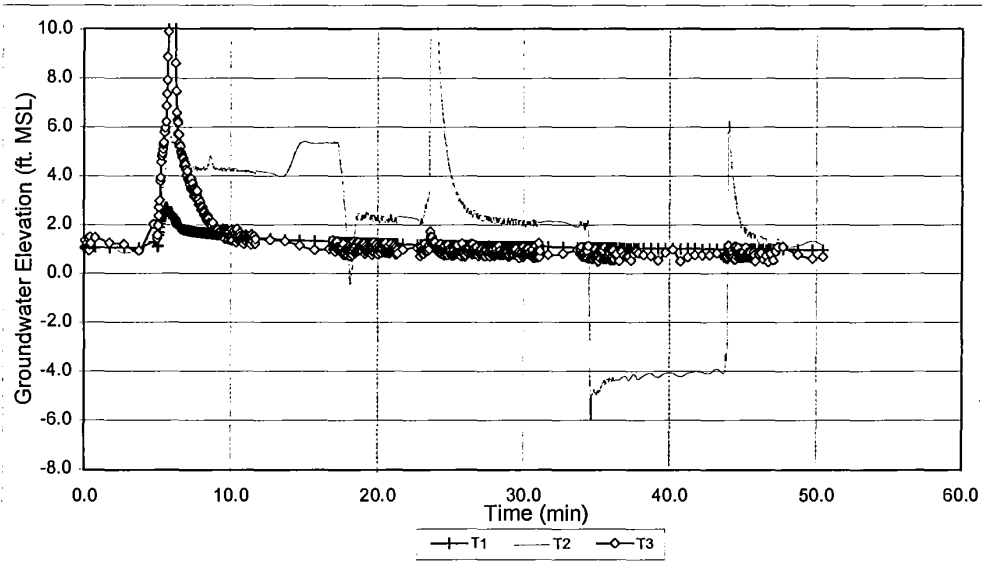
**WELL MW-8R
TEST 1
ARITHMETIC PLOT**

TEST PARAMETERS

TOP OF INTERVAL	109.72 Ft. BGS
BOTTOM OF INTERVAL	119.32 Ft. BGS
LENGTH OF TEST INTERVAL	9.60 Ft.

INITIAL HYDRAULIC HEAD (H_i)	1.90 Ft. MSL
HYDRAULIC HEAD AT BEGINNING OF SLUG TEST (H_{os})	-5.95 Ft. MSL
MAXIMUM HYDRAULIC HEAD DIFFERENCE ($H_i - H_{os}$)	7.85 Ft.
HYDRAULIC HEAD AT BEGINNING OF RECOVERY TEST (H_{or})	-2.60 Ft. MSL
HYDRAULIC HEAD DIFFERENCE ($H_{os} - H_{or}$)	3.34 Ft.

TEST ELAPSED TIME TO BEGINNING OF SLUG TEST (t ; $T = 0$)	34.63 min.
TEST ELAPSED TIME TO BEGINNING OF RECOVERY TEST (t ; $T' = 0$)	43.93 min.



Project Name: 216 Paterson Plank Road Site, New Jersey
Project No.: 943-6222
Test Date: 7/11/96

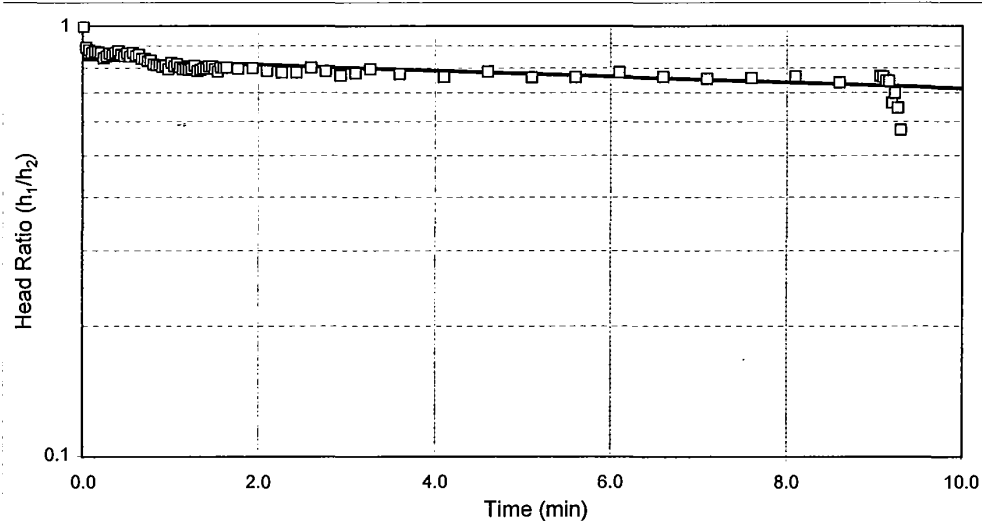
Analysis By: DSL
Checked By: FG
Analysis Date: 1/14/97

**WELL MW-8R
TEST 1
HVORSLEV FLOW PERIOD ANALYSIS**

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet);
 R_e = equivalent radius (feet);
 L_e = length of screened interval (feet);
 t = time (seconds); and,
 h_t = head at time t (feet).

INPUT PARAMETERS		RESULTS	
r_c =	0.08	K= 1.14E-05 cm/sec K= 3.22E-02 ft/day	
R_e =	0.16		
L_e =	10.00		
t_1 =	0.00		
t_2 =	10.00		
h_1/h_0 =	0.84		
h_2/h_0 =	0.72		



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 7/11/96

Analysis By: DSL
 Checked By: FG
 Analysis Date: 1/14/97

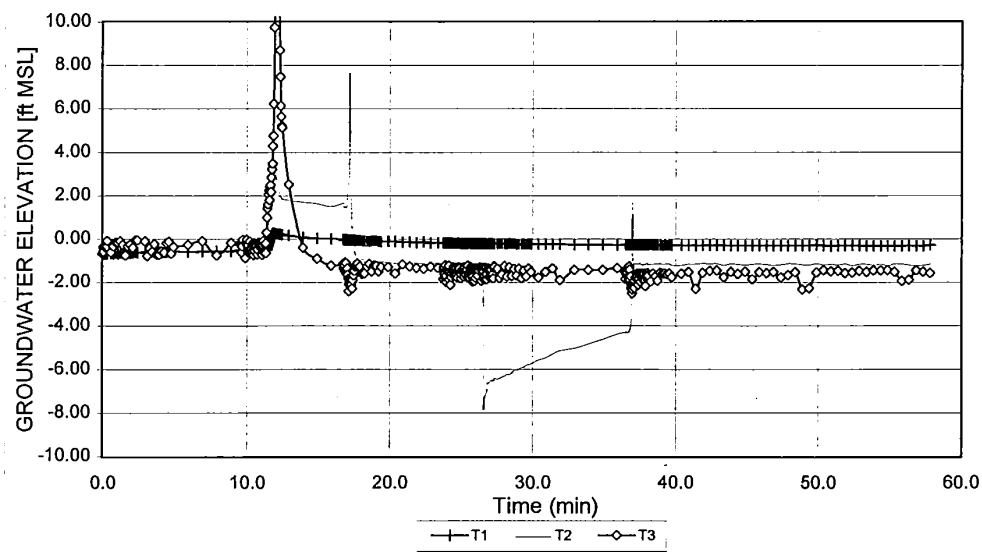
WELL MW-8R
TEST 2
ARITHMETIC PLOT

TEST PARAMETERS

TOP OF INTERVAL	99.32 Ft. BGS
BOTTOM OF INTERVAL	109.32 Ft. BGS
LENGTH OF TEST INTERVAL	10.00 Ft.

INITIAL HYDRAULIC HEAD (H_i)	-1.26 Ft. MSL
HYDRAULIC HEAD AT BEGINNING OF SLUG TEST (H_{os})	-7.86 Ft. MSL
MAXIMUM HYDRAULIC HEAD DIFFERENCE ($H_i - H_{os}$)	6.60 Ft.
HYDRAULIC HEAD AT BEGINNING OF RECOVERY TEST (H_{or})	-3.85 Ft. MSL
HYDRAULIC HEAD DIFFERENCE ($H_{os} - H_{or}$)	4.01 Ft.

TEST ELAPSED TIME TO BEGINNING OF SLUG TEST ($t; T = 0$)	26.60 min.
TEST ELAPSED TIME TO BEGINNING OF RECOVERY TEST ($t; T' = 0$)	36.87 min.



Project Name: 216 Paterson Plank Road Site, New Jersey
Project No.: 943-6222
Test Date: 7/20/96

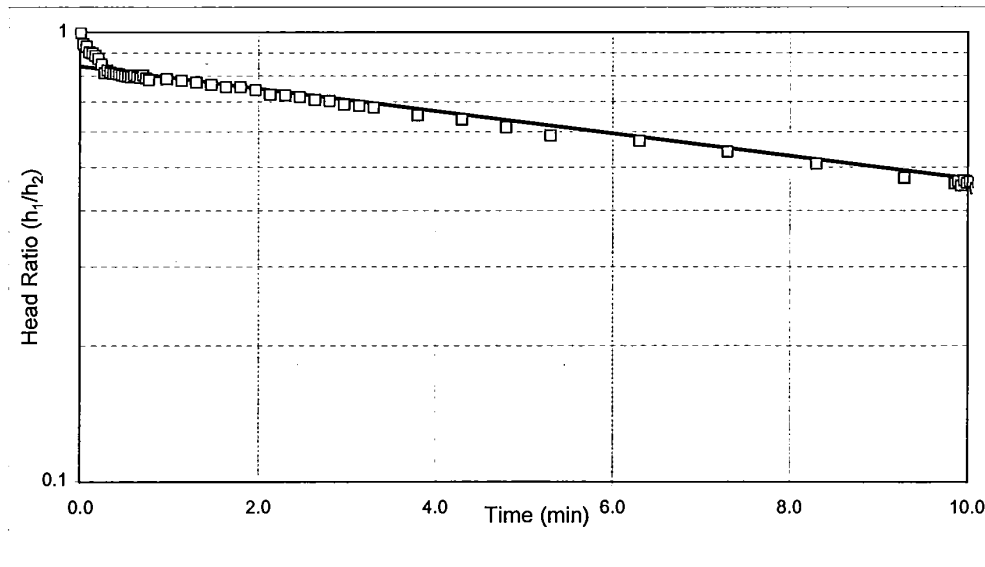
Analysis By: DSL
Checked By: FG
Analysis Date: 1/14/97

**WELL MW-8R
TEST 2
Hvorslev Flow Period Analysis**

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet);
 R_e = equivalent radius (feet);
 L_e = length of screened interval (feet);
 t = time (seconds); and,
 h_t = head at time t (feet).

INPUT PARAMETERS		RESULTS
$r_c =$	0.08	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> $K = 4.11E-05 \text{ cm/sec}$ $K = 1.17E-01 \text{ ft/day}$ </div>
$R_e =$	0.16	
$L_e =$	10.00	
$t_1 =$	0.00	
$t_2 =$	10.00	
$h_1/h_0 =$	0.84	
$h_2/h_0 =$	0.47	



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 7/20/96

Analysis By: DSL
 Checked By: FG
 Analysis Date: 1/14/97

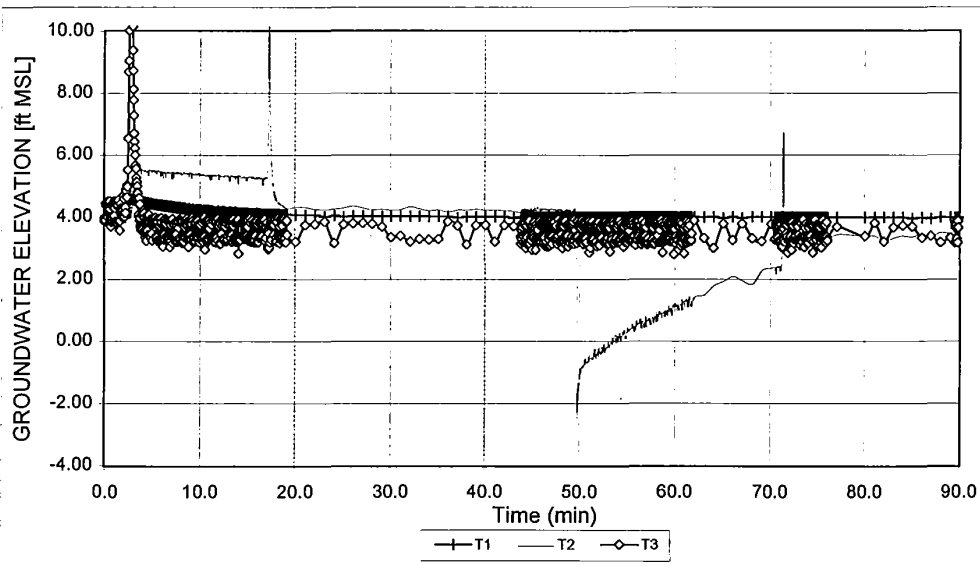
WELL MW-8R
TEST 3
ARITHMETIC PLOT

TEST PARAMETERS

TOP OF INTERVAL	89.22 Ft. BGS
BOTTOM OF INTERVAL	98.82 Ft. BGS
LENGTH OF TEST INTERVAL	9.60 Ft.

INITIAL HYDRAULIC HEAD (H_i)	4.21 Ft. MSL
HYDRAULIC HEAD AT BEGINNING OF SLUG TEST (H_{os})	-2.49 Ft. MSL
MAXIMUM HYDRAULIC HEAD DIFFERENCE ($H_i - H_{os}$)	6.70 Ft.
HYDRAULIC HEAD AT BEGINNING OF RECOVERY TEST (H_{or})	2.87 Ft. MSL
HYDRAULIC HEAD DIFFERENCE ($H_{os} - H_{or}$)	5.36 Ft.

TEST ELAPSED TIME TO BEGINNING OF SLUG TEST ($t; T = 0$)	49.77 min.
TEST ELAPSED TIME TO BEGINNING OF RECOVERY TEST ($t; T' = 0$)	71.30 min.



Project Name: 216 Paterson Plank Road Site, New Jersey
Project No.: 943-6222
Test Date: 7/11/96

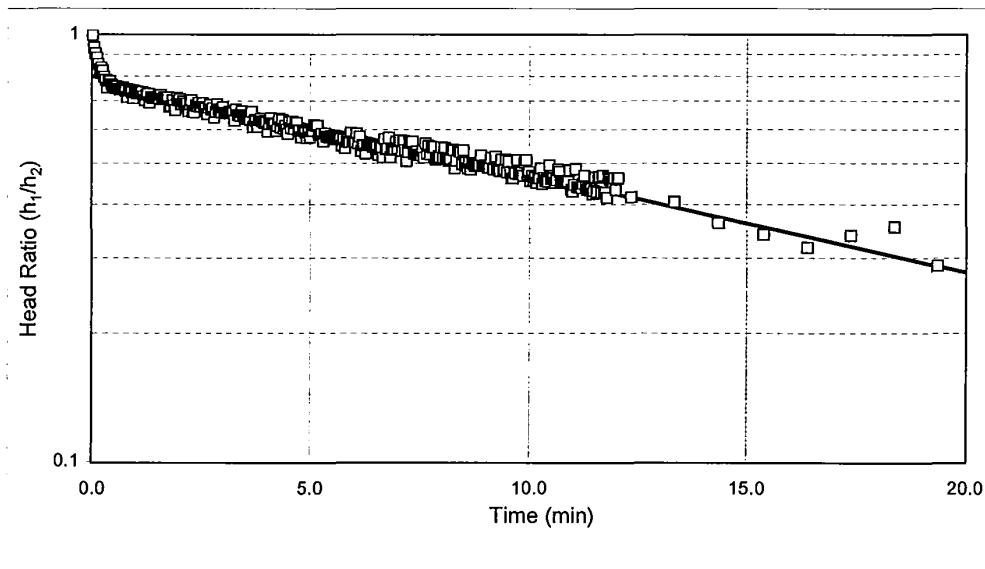
Analysis By: DSL
Checked By: FG
Analysis Date: 1/14/97

**WELL MW-8R
TEST 3
Hvorslev Flow Period Analysis**

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet);
 R_e = equivalent radius (feet);
 L_e = length of screened interval (feet);
 t = time (seconds); and,
 h_t = head at time t (feet).

INPUT PARAMETERS		RESULTS
r_c =	0.08	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> $K = 3.78E-05 \text{ cm/sec}$ $K = 1.07E-01 \text{ ft/day}$ </div>
R_e =	0.16	
L_e =	10.00	
t_1 =	0.00	
t_2 =	20.00	
h_1/h_0 =	0.80	
h_2/h_0 =	0.28	



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 7/11/96

Analysis By: DSL
 Checked By: FG
 Analysis Date: 1/14/97

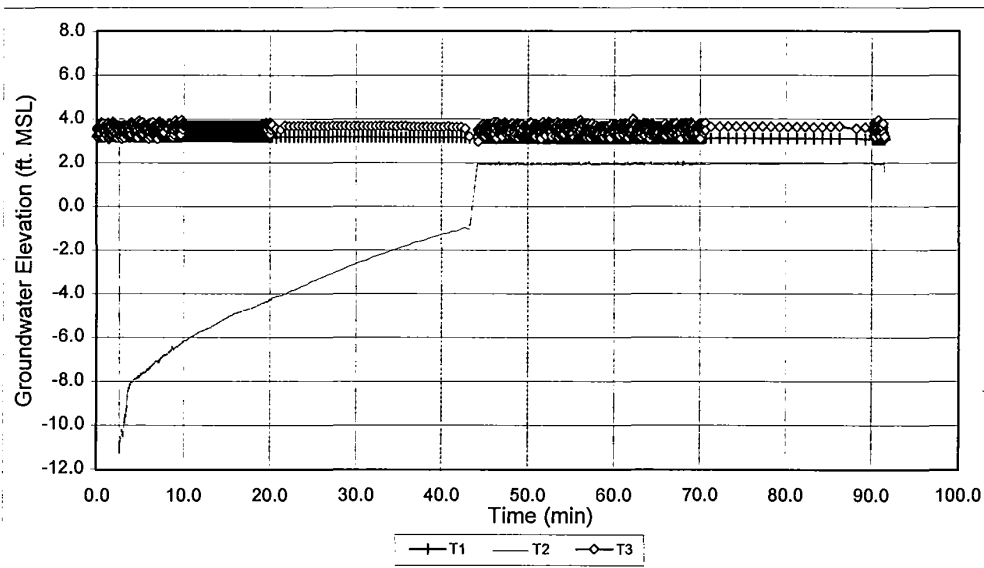
**WELL MW-8R
TEST 4
ARITHMETIC PLOT**

TEST PARAMETERS

TOP OF INTERVAL	104.00 Ft. BGS
BOTTOM OF INTERVAL	113.60 Ft. BGS
LENGTH OF TEST INTERVAL	9.60 Ft.

INITIAL HYDRAULIC HEAD (H_i)	3.21 Ft. MSL
HYDRAULIC HEAD AT BEGINNING OF SLUG TEST (H_{os})	-11.30 Ft. MSL
MAXIMUM HYDRAULIC HEAD DIFFERENCE ($H_i - H_{os}$)	14.51 Ft.
HYDRAULIC HEAD AT BEGINNING OF RECOVERY TEST (H_{or})	-1.01 Ft. MSL
HYDRAULIC HEAD DIFFERENCE ($H_{os} - H_{or}$)	10.29 Ft.

TEST ELAPSED TIME TO BEGINNING OF SLUG TEST ($t; T = 0$)	2.60 min.
TEST ELAPSED TIME TO BEGINNING OF RECOVERY TEST ($t; T' = 0$)	43.27 min.



Project Name: 216 Paterson Plank Road Site, New Jersey
Project No.: 943-6222
Test Date: 7/11/96

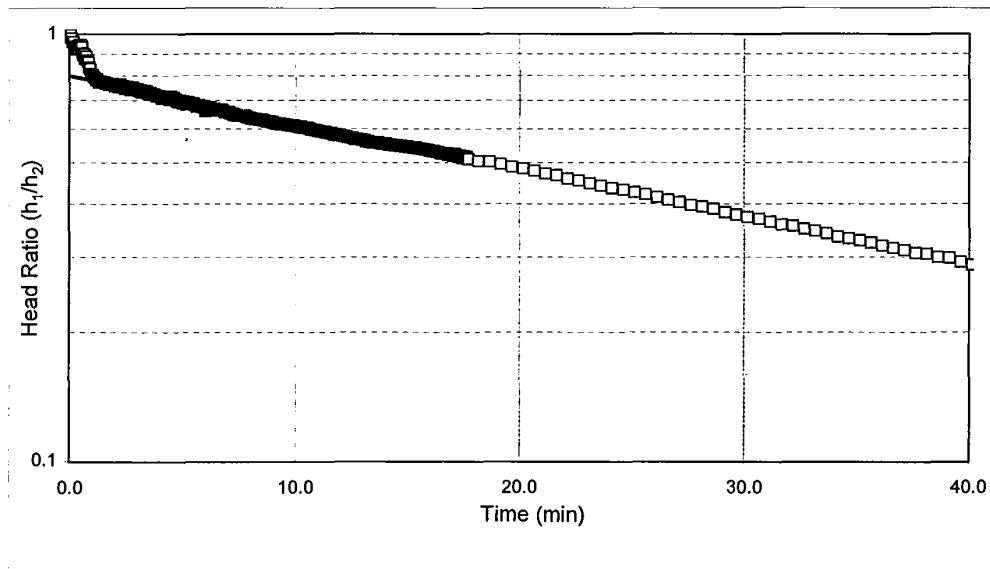
Analysis By: DSL
Checked By: FG
Analysis Date: 1/17/97

WELL MW-8R
TEST 4
Hvorslev Flow Period Analysis

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet);
 R_e = equivalent radius (feet);
 L_e = length of screened interval (feet);
 t = time (seconds); and,
 h_t = head at time t (feet).

INPUT PARAMETERS		RESULTS
r_c =	0.08	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> $K = 1.79E-05 \text{ cm/sec}$ $K = 5.06E-02 \text{ ft/day}$ </div>
R_e =	0.16	
L_e =	10.00	
t_1 =	0.00	
t_2 =	40.00	
h_1/h_0 =	0.80	
h_2/h_0 =	0.29	



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 7/11/96

Analysis By: DSL
 Checked By: FG
 Analysis Date: 1/17/97

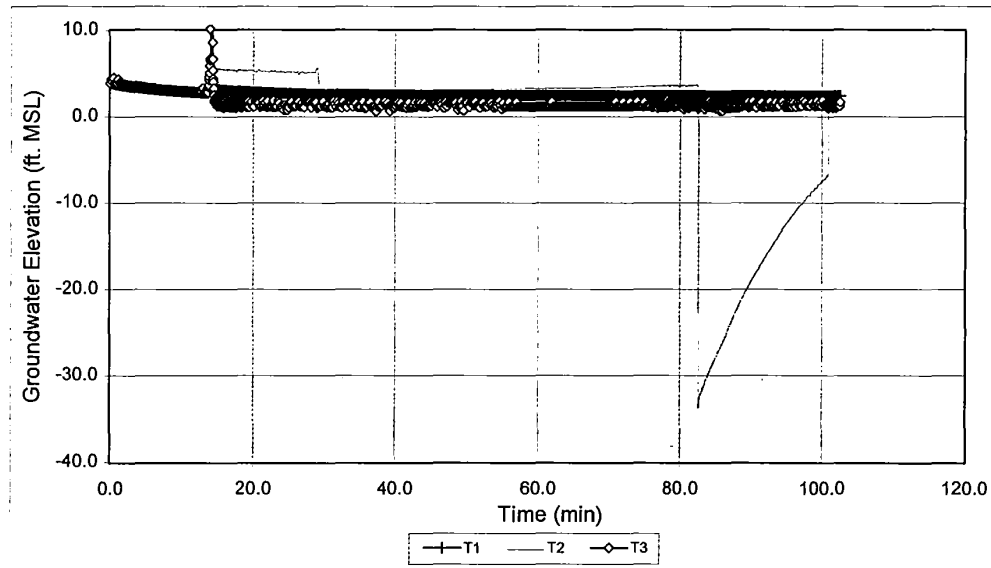
WELL MW-8R
TEST 5
ARITHMETIC PLOT

TEST PARAMETERS

TOP OF INTERVAL	114.00 Ft. BGS
BOTTOM OF INTERVAL	130.00 Ft. BGS
LENGTH OF TEST INTERVAL	16.00 Ft.

INITIAL HYDRAULIC HEAD (H_i)	3.44 Ft. MSL
HYDRAULIC HEAD AT BEGINNING OF SLUG TEST (H_{os})	-33.98 Ft. MSL
MAXIMUM HYDRAULIC HEAD DIFFERENCE ($H_i - H_{os}$)	37.42 Ft.
HYDRAULIC HEAD AT BEGINNING OF RECOVERY TEST (H_{or})	9.95 Ft. MSL
HYDRAULIC HEAD DIFFERENCE ($H_{os} - H_{or}$)	43.93 Ft.

TEST ELAPSED TIME TO BEGINNING OF SLUG TEST ($t; T = 0$)	82.60 min.
TEST ELAPSED TIME TO BEGINNING OF RECOVERY TEST ($t; T' = 0$)	100.90 min.



Project Name: 216 Paterson Plank Road Site, New Jersey
Project No.: 943-6222
Test Date: 7/11/96

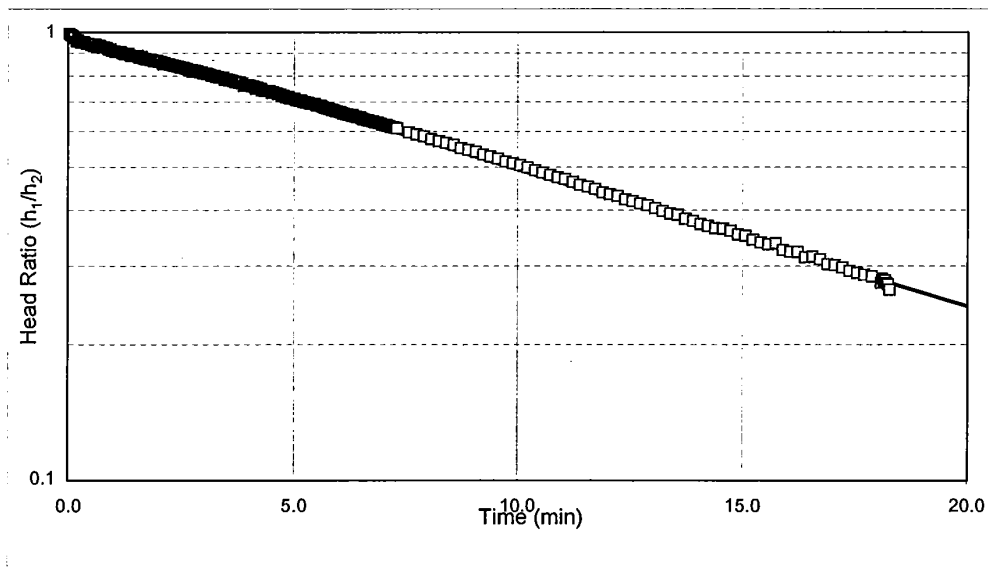
Analysis By: DSL
Checked By: FG
Analysis Date: 1/17/97

WELL MW-8R
TEST 5
HVORSLEV FLOW PERIOD ANALYSIS

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet);
 R_e = equivalent radius (feet);
 L_e = length of screened interval (feet);
 t = time (seconds); and,
 h_t = head at time t (feet).

INPUT PARAMETERS		RESULTS	
r_c =	0.08	K= 5.03E-05 cm/sec K= 1.43E-01 ft/day	
R_e =	0.16		
L_e =	10.00		
t_1 =	0.00		
t_2 =	20.00		
h_1/h_0 =	1.00		
h_2/h_0 =	0.24		



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 7/11/96

Analysis By: DSL
 Checked By: FG
 Analysis Date: 1/17/97

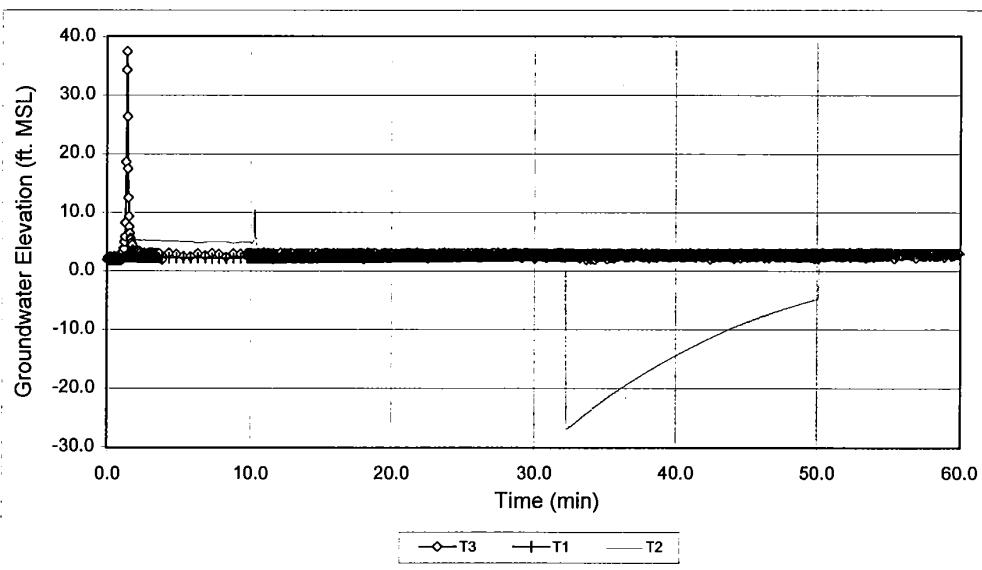
**WELL MW-8R
TEST 6
ARITHMETIC PLOT**

TEST PARAMETERS

TOP OF INTERVAL	89.50 Ft. BGS
BOTTOM OF INTERVAL	99.10 Ft. BGS
LENGTH OF TEST INTERVAL	9.60 Ft.

INITIAL HYDRAULIC HEAD (H_i)	2.67 Ft. MSL
HYDRAULIC HEAD AT BEGINNING OF SLUG TEST (H_{os})	-26.94 Ft. MSL
MAXIMUM HYDRAULIC HEAD DIFFERENCE ($H_i - H_{os}$)	29.61 Ft.
HYDRAULIC HEAD AT BEGINNING OF RECOVERY TEST (H_{or})	-4.32 Ft. MSL
HYDRAULIC HEAD DIFFERENCE ($H_{os} - H_{or}$)	22.62 Ft.

TEST ELAPSED TIME TO BEGINNING OF SLUG TEST ($t; T = 0$)	32.30 min.
TEST ELAPSED TIME TO BEGINNING OF RECOVERY TEST ($t; T' = 0$)	50.10 min.



Project Name: CARLSTADT / COORDINATION / NJ
Project No.: 943-6222
Test Date: 7/20/96

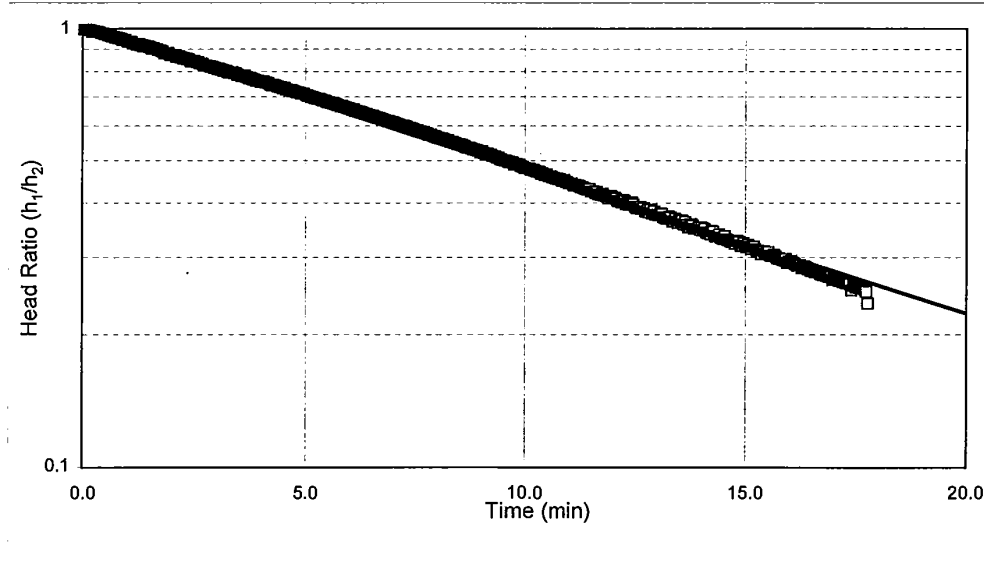
Analysis By: DSL
Checked By: FG
Analysis Date: 1/14/97

**WELL MW-8R
TEST 6
HVORSLEV FLOW PERIOD ANALYSIS**

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet);
 R_e = equivalent radius (feet);
 L_e = length of screened interval (feet);
 t = time (seconds); and,
 h_t = head at time t (feet).

INPUT PARAMETERS		RESULTS
r_c	= 0.08	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> $K = 5.35E-05$ cm/sec $K = 1.52E-01$ ft/day </div>
R_e	= 0.16	
L_e	= 10.00	
t_1	= 0.00	
t_2	= 20.00	
h_1/h_0	= 1.00	
h_2/h_0	= 0.22	



Project Name: CARLSTADT / COORDINATION / NJ
 Project No.: 943-6222
 Test Date: 7/20/96

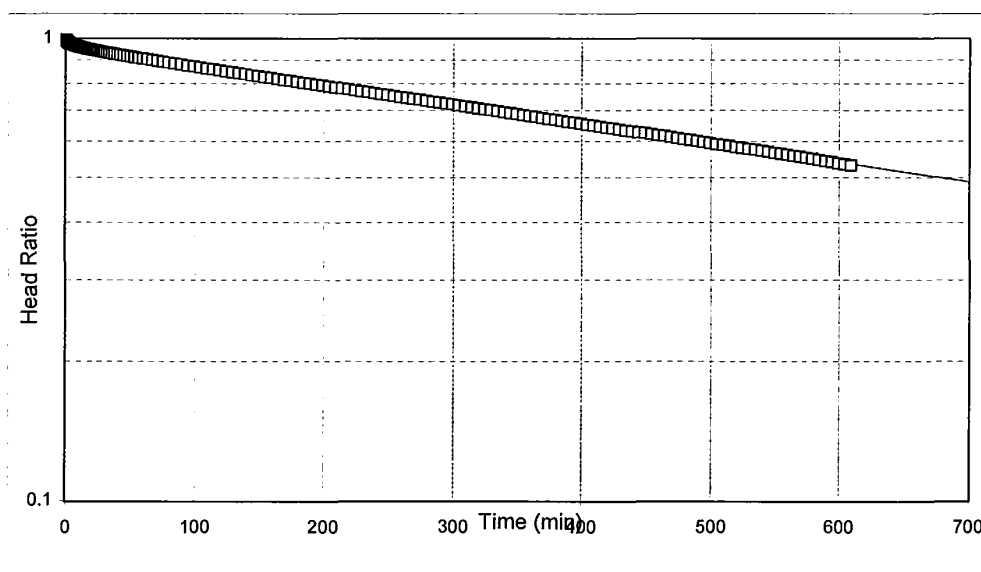
Analysis By: DSL
 Checked By: FG
 Analysis Date: 1/14/97

HVORSLEV SLUG TEST ANALYSIS RISING HEAD TEST MW-10D

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet)
 R_e = equivalent radius (feet)
 L_e = length of screened interval (feet)
 t = time (minutes)
 h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS
r_c	= 0.17	<div> <div>K= 3.19E-06 cm/sec</div> <div>K= 9.06E-03 ft/day</div> </div>
R_e	= 0.33	
L_e	= 6.5	
t_1	= 0	
t_2	= 700	
h_1/h_0	= 0.98	
h_2/h_0	= 0.49	



Project Name: 216 Paterson Plank Road Site, New Jersey
Project No.: 943-6222
Test Date: 08/29/96

Analysis By: SDM
Checked By: FG
Analysis Date: 1/17/97

RISING HEAD TEST MW-10D

WELL NO. MW-10D

DATE 8/29/96
 INITIAL DEPTH TO WATER 10.05 FEET (btoc)
 CASING DIAMETER 4 INCHES
 SAND DIAMETER 8 INCHES
 TOP OF OPEN INTERVAL 35.5 FEET (btoc)
 BOTTOM OF OPEN INTERVAL 42 FEET (btoc)
 SATURATED THICKNESS 7.5 FEET
 WATER TABLE TO BOTTOM OF SCREEN 31.95 FEET
 EQUIVALENT DIAMETER 5.51 INCHES
 OPEN INTERVAL LENGTH 6.5 FEET
 STATIC IN SCREEN? N
 MAX. HEAD CHANGE 12.06 FEET
 MAX. HEAD IN SCREEN? N

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/29/96	7:52:09	0	22.11		12.06	
8/29/96	7:52:09	0.005	21.478		11.43	
8/29/96	7:52:09	0.01	22.325		12.28	
8/29/96	7:52:09	0.015	21.729		11.68	
8/29/96	7:52:10	0.02	21.972		11.92	
8/29/96	7:52:10	0.025	22.022		11.97	
8/29/96	7:52:10	0.03	21.99		11.94	
8/29/96	7:52:11	0.035	22.177		12.13	
8/29/96	7:52:11	0.04	22.087		12.04	
8/29/96	7:52:11	0.045	22.131	0.000	12.08	1.00
8/29/96	7:52:12	0.05	22.103	0.005	12.05	1.00
8/29/96	7:52:12	0.055	22.101	0.010	12.05	1.00
8/29/96	7:52:12	0.06	22.124	0.015	12.07	1.00
8/29/96	7:52:12	0.065	22.101	0.020	12.05	1.00
8/29/96	7:52:13	0.07	22.11	0.025	12.06	1.00
8/29/96	7:52:13	0.075	22.101	0.030	12.05	1.00
8/29/96	7:52:13	0.08	22.101	0.035	12.05	1.00
8/29/96	7:52:14	0.085	22.092	0.040	12.04	1.00
8/29/96	7:52:14	0.09	22.099	0.045	12.05	1.00
8/29/96	7:52:14	0.095	22.094	0.050	12.04	1.00
8/29/96	7:52:15	0.1	22.101	0.055	12.05	1.00
8/29/96	7:52:15	0.1058	22.089	0.061	12.04	1.00
8/29/96	7:52:15	0.112	22.089	0.067	12.04	1.00
8/29/96	7:52:16	0.1185	22.087	0.074	12.04	1.00
8/29/96	7:52:16	0.1255	22.085	0.081	12.04	1.00
8/29/96	7:52:16	0.1328	22.085	0.088	12.04	1.00
8/29/96	7:52:17	0.1407	22.099	0.096	12.05	1.00
8/29/96	7:52:17	0.149	22.078	0.104	12.03	1.00
8/29/96	7:52:18	0.1578	22.078	0.113	12.03	1.00
8/29/96	7:52:19	0.1672	22.073	0.122	12.02	1.00
8/29/96	7:52:19	0.177	22.073	0.132	12.02	1.00
8/29/96	7:52:20	0.1875	22.069	0.143	12.02	1.00
8/29/96	7:52:20	0.1985	22.069	0.154	12.02	1.00
8/29/96	7:52:21	0.2102	22.066	0.165	12.02	1.00
8/29/96	7:52:22	0.2227	22.062	0.178	12.01	1.00
8/29/96	7:52:23	0.2358	22.062	0.191	12.01	1.00
8/29/96	7:52:23	0.2498	22.057	0.205	12.01	1.00
8/29/96	7:52:24	0.2647	22.052	0.220	12.00	1.00
8/29/96	7:52:25	0.2803	22.048	0.235	12.00	0.99

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/29/96	7:52:26	0.297	22.043	0.252	11.99	0.99
8/29/96	7:52:27	0.3147	22.041	0.270	11.99	0.99
8/29/96	7:52:29	0.3333	22.036	0.288	11.99	0.99
8/29/96	7:52:30	0.3532	22.034	0.308	11.98	0.99
8/29/96	7:52:31	0.3742	22.029	0.329	11.98	0.99
8/29/96	7:52:32	0.3963	22.027	0.351	11.98	0.99
8/29/96	7:52:34	0.4198	22.025	0.375	11.98	0.99
8/29/96	7:52:35	0.4447	22.02	0.400	11.97	0.99
8/29/96	7:52:37	0.4697	22.013	0.425	11.96	0.99
8/29/96	7:52:38	0.4963	22.009	0.451	11.96	0.99
8/29/96	7:52:40	0.5247	22.004	0.480	11.95	0.99
8/29/96	7:52:42	0.5547	21.999	0.510	11.95	0.99
8/29/96	7:52:44	0.5863	21.992	0.541	11.94	0.99
8/29/96	7:52:46	0.6213	21.986	0.576	11.94	0.99
8/29/96	7:52:48	0.658	21.981	0.613	11.93	0.99
8/29/96	7:52:50	0.6963	21.974	0.651	11.92	0.99
8/29/96	7:52:53	0.738	21.969	0.693	11.92	0.99
8/29/96	7:52:55	0.7813	21.965	0.736	11.92	0.99
8/29/96	7:52:58	0.828	21.958	0.783	11.91	0.99
8/29/96	7:53:01	0.8763	21.953	0.831	11.90	0.99
8/29/96	7:53:04	0.928	21.949	0.883	11.90	0.99
8/29/96	7:53:07	0.983	21.944	0.938	11.89	0.99
8/29/96	7:53:11	1.0413	21.937	0.996	11.89	0.99
8/29/96	7:53:15	1.103	21.93	1.058	11.88	0.99
8/29/96	7:53:19	1.168	21.926	1.123	11.88	0.98
8/29/96	7:53:23	1.238	21.919	1.193	11.87	0.98
8/29/96	7:53:27	1.3113	21.914	1.266	11.86	0.98
8/29/96	7:53:32	1.3897	21.907	1.345	11.86	0.98
8/29/96	7:53:37	1.473	21.902	1.428	11.85	0.98
8/29/96	7:53:42	1.5613	21.898	1.516	11.85	0.98
8/29/96	7:53:48	1.6547	21.893	1.610	11.84	0.98
8/29/96	7:53:54	1.753	21.886	1.708	11.84	0.98
8/29/96	7:54:00	1.858	21.882	1.813	11.83	0.98
8/29/96	7:54:07	1.968	21.877	1.923	11.83	0.98
8/29/96	7:54:14	2.0847	21.87	2.040	11.82	0.98
8/29/96	7:54:21	2.2097	21.866	2.165	11.82	0.98
8/29/96	7:54:29	2.3413	21.861	2.296	11.81	0.98
8/29/96	7:54:37	2.4813	21.854	2.436	11.80	0.98
8/29/96	7:54:46	2.6297	21.849	2.585	11.80	0.98
8/29/96	7:54:56	2.7863	21.842	2.741	11.79	0.98
8/29/96	7:55:06	2.953	21.838	2.908	11.79	0.98
8/29/96	7:55:16	3.1297	21.831	3.085	11.78	0.98
8/29/96	7:55:27	3.3163	21.824	3.271	11.77	0.98
8/29/96	7:55:39	3.5147	21.819	3.470	11.77	0.98
8/29/96	7:55:52	3.7247	21.813	3.680	11.76	0.98
8/29/96	7:56:05	3.9463	21.806	3.901	11.76	0.97
8/29/96	7:56:19	4.1813	21.799	4.136	11.75	0.97
8/29/96	7:56:34	4.4297	21.792	4.385	11.74	0.97
8/29/96	7:56:50	4.693	21.783	4.648	11.73	0.97
8/29/96	7:57:07	4.973	21.776	4.928	11.73	0.97
8/29/96	7:57:25	5.2697	21.766	5.225	11.72	0.97
8/29/96	7:57:43	5.583	21.759	5.538	11.71	0.97
8/29/96	7:58:03	5.9147	21.75	5.870	11.70	0.97
8/29/96	7:58:24	6.2663	21.741	6.221	11.69	0.97
8/29/96	7:58:47	6.6397	21.729	6.595	11.68	0.97
8/29/96	7:59:11	7.0347	21.72	6.990	11.67	0.97

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/29/96	7:59:36	7.453	21.713	7.408	11.66	0.97
8/29/96	8:00:02	7.8963	21.702	7.851	11.65	0.97
8/29/96	8:00:30	8.3663	21.69	8.321	11.64	0.97
8/29/96	8:01:00	8.8647	21.681	8.820	11.63	0.96
8/29/96	8:01:32	9.3913	21.669	9.346	11.62	0.96
8/29/96	8:02:05	9.9497	21.658	9.905	11.61	0.96
8/29/96	8:02:41	10.5413	21.646	10.496	11.60	0.96
8/29/96	8:03:19	11.168	21.633	11.123	11.58	0.96
8/29/96	8:03:58	11.8313	21.619	11.786	11.57	0.96
8/29/96	8:04:41	12.5347	21.605	12.490	11.56	0.96
8/29/96	8:05:25	13.2797	21.591	13.235	11.54	0.96
8/29/96	8:06:13	14.0697	21.575	14.025	11.53	0.96
8/29/96	8:07:03	14.9063	21.561	14.861	11.51	0.95
8/29/96	8:07:56	15.7913	21.543	15.746	11.49	0.95
8/29/96	8:08:52	16.7297	21.529	16.685	11.48	0.95
8/29/96	8:09:52	17.723	21.513	17.678	11.46	0.95
8/29/96	8:10:55	18.7763	21.496	18.731	11.45	0.95
8/29/96	8:12:02	19.8913	21.48	19.846	11.43	0.95
8/29/96	8:13:13	21.073	21.464	21.028	11.41	0.95
8/29/96	8:14:28	22.3247	21.446	22.280	11.40	0.94
8/29/96	8:15:47	23.6497	21.427	23.605	11.38	0.94
8/29/96	8:17:12	25.0547	21.409	25.010	11.36	0.94
8/29/96	8:18:41	26.543	21.386	26.498	11.34	0.94
8/29/96	8:20:16	28.118	21.367	28.073	11.32	0.94
8/29/96	8:21:56	29.7863	21.347	29.741	11.30	0.94
8/29/96	8:23:42	31.5547	21.323	31.510	11.27	0.93
8/29/96	8:25:34	33.428	21.3	33.383	11.25	0.93
8/29/96	8:27:33	35.4113	21.275	35.366	11.23	0.93
8/29/96	8:29:39	37.513	21.247	37.468	11.20	0.93
8/29/96	8:31:53	39.7397	21.22	39.695	11.17	0.93
8/29/96	8:34:14	42.098	21.192	42.053	11.14	0.92
8/29/96	8:36:44	44.5963	21.162	44.551	11.11	0.92
8/29/96	8:39:23	47.243	21.132	47.198	11.08	0.92
8/29/96	8:42:11	50.0463	21.097	50.001	11.05	0.92
8/29/96	8:45:09	53.0147	21.063	52.970	11.01	0.91
8/29/96	8:48:18	56.1597	21.028	56.115	10.98	0.91
8/29/96	8:51:38	59.4913	20.991	59.446	10.94	0.91
8/29/96	8:55:10	63.0197	20.952	62.975	10.90	0.90
8/29/96	8:58:54	66.758	20.908	66.713	10.86	0.90
8/29/96	9:02:52	70.718	20.867	70.673	10.82	0.90
8/29/96	9:07:03	74.9113	20.823	74.866	10.77	0.89
8/29/96	9:11:30	79.3547	20.774	79.310	10.72	0.89
8/29/96	9:16:12	84.0613	20.724	84.016	10.67	0.89
8/29/96	9:21:11	89.0463	20.671	89.001	10.62	0.88
8/29/96	9:26:11	94.0463	20.62	94.001	10.57	0.88
8/29/96	9:31:11	99.0463	20.567	99.001	10.52	0.87
8/29/96	9:36:11	104.0463	20.518	104.001	10.47	0.87
8/29/96	9:41:11	109.0463	20.468	109.001	10.42	0.86
8/29/96	9:46:11	114.0463	20.417	114.001	10.37	0.86
8/29/96	9:51:11	119.0463	20.369	119.001	10.32	0.86
8/29/96	9:56:11	124.0463	20.32	124.001	10.27	0.85
8/29/96	10:01:11	129.0463	20.272	129.001	10.22	0.85
8/29/96	10:06:11	134.0463	20.223	134.001	10.17	0.84
8/29/96	10:11:11	139.0463	20.175	139.001	10.13	0.84
8/29/96	10:16:11	144.0463	20.129	144.001	10.08	0.84
8/29/96	10:21:11	149.0463	20.08	149.001	10.03	0.83

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/29/96	10:26:11	154.0463	20.032	154.001	9.98	0.83
8/29/96	10:31:11	159.0463	19.986	159.001	9.94	0.82
8/29/96	10:36:11	164.0463	19.937	164.001	9.89	0.82
8/29/96	10:41:11	169.0463	19.891	169.001	9.84	0.82
8/29/96	10:46:11	174.0463	19.845	174.001	9.80	0.81
8/29/96	10:51:11	179.0463	19.801	179.001	9.75	0.81
8/29/96	10:56:11	184.0463	19.753	184.001	9.70	0.80
8/29/96	11:01:11	189.0463	19.709	189.001	9.66	0.80
8/29/96	11:06:11	194.0463	19.663	194.001	9.61	0.80
8/29/96	11:11:11	199.0463	19.617	199.001	9.57	0.79
8/29/96	11:16:11	204.0463	19.57	204.001	9.52	0.79
8/29/96	11:21:11	209.0463	19.527	209.001	9.48	0.79
8/29/96	11:26:11	214.0463	19.48	214.001	9.43	0.78
8/29/96	11:31:11	219.0463	19.437	219.001	9.39	0.78
8/29/96	11:36:11	224.0463	19.393	224.001	9.34	0.77
8/29/96	11:41:11	229.0463	19.349	229.001	9.30	0.77
8/29/96	11:46:11	234.0463	19.307	234.001	9.26	0.77
8/29/96	11:51:11	239.0463	19.261	239.001	9.21	0.76
8/29/96	11:56:11	244.0463	19.217	244.001	9.17	0.76
8/29/96	12:01:11	249.0463	19.174	249.001	9.12	0.76
8/29/96	12:06:11	254.0463	19.132	254.001	9.08	0.75
8/29/96	12:11:11	259.0463	19.088	259.001	9.04	0.75
8/29/96	12:16:11	264.0463	19.044	264.001	8.99	0.75
8/29/96	12:21:11	269.0463	19.003	269.001	8.95	0.74
8/29/96	12:26:11	274.0463	18.959	274.001	8.91	0.74
8/29/96	12:31:11	279.0463	18.918	279.001	8.87	0.74
8/29/96	12:36:11	284.0463	18.876	284.001	8.83	0.73
8/29/96	12:41:11	289.0463	18.835	289.001	8.79	0.73
8/29/96	12:46:11	294.0463	18.795	294.001	8.75	0.73
8/29/96	12:51:11	299.0463	18.754	299.001	8.70	0.72
8/29/96	12:56:11	304.0463	18.712	304.001	8.66	0.72
8/29/96	13:01:11	309.0463	18.671	309.001	8.62	0.71
8/29/96	13:06:11	314.0463	18.629	314.001	8.58	0.71
8/29/96	13:11:11	319.0463	18.588	319.001	8.54	0.71
8/29/96	13:16:11	324.0463	18.549	324.001	8.50	0.70
8/29/96	13:21:11	329.0463	18.507	329.001	8.46	0.70
8/29/96	13:26:11	334.0463	18.468	334.001	8.42	0.70
8/29/96	13:31:11	339.0463	18.429	339.001	8.38	0.69
8/29/96	13:36:11	344.0463	18.387	344.001	8.34	0.69
8/29/96	13:41:11	349.0463	18.348	349.001	8.30	0.69
8/29/96	13:46:11	354.0463	18.306	354.001	8.26	0.68
8/29/96	13:51:11	359.0463	18.267	359.001	8.22	0.68
8/29/96	13:56:11	364.0463	18.23	364.001	8.18	0.68
8/29/96	14:01:11	369.0463	18.191	369.001	8.14	0.68
8/29/96	14:06:11	374.0463	18.152	374.001	8.10	0.67
8/29/96	14:11:11	379.0463	18.115	379.001	8.07	0.67
8/29/96	14:16:11	384.0463	18.076	384.001	8.03	0.67
8/29/96	14:21:11	389.0463	18.036	389.001	7.99	0.66
8/29/96	14:26:11	394.0463	17.997	394.001	7.95	0.66
8/29/96	14:31:11	399.0463	17.958	399.001	7.91	0.66
8/29/96	14:36:11	404.0463	17.921	404.001	7.87	0.65
8/29/96	14:41:11	409.0463	17.884	409.001	7.83	0.65
8/29/96	14:46:11	414.0463	17.847	414.001	7.80	0.65
8/29/96	14:51:11	419.0463	17.808	419.001	7.76	0.64
8/29/96	14:56:11	424.0463	17.771	424.001	7.72	0.64
8/29/96	15:01:11	429.0463	17.734	429.001	7.68	0.64

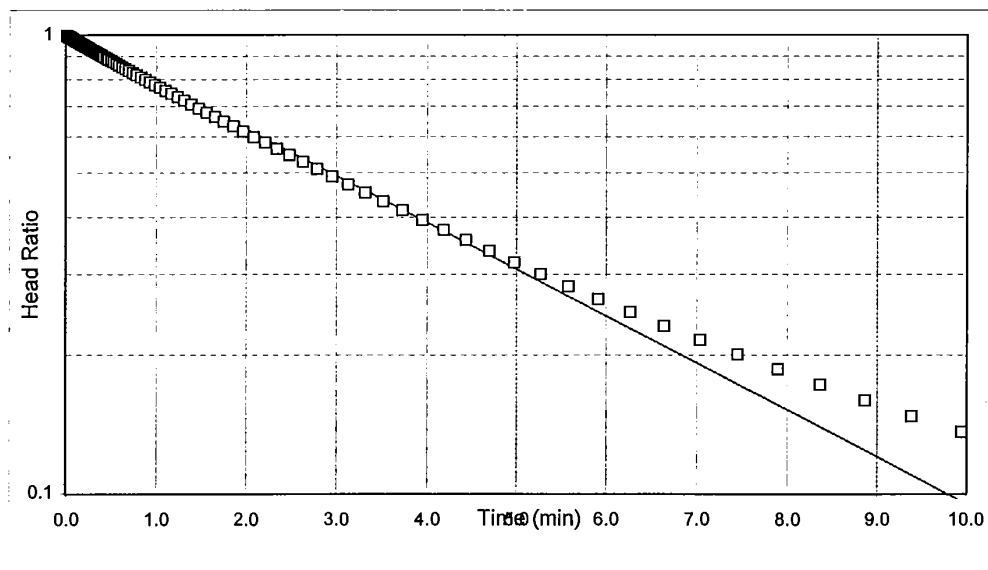
DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/29/96	15:06:11	434.0463	17.695	434.001	7.65	0.63
8/29/96	15:11:11	439.0463	17.663	439.001	7.61	0.63
8/29/96	15:16:11	444.0463	17.626	444.001	7.58	0.63
8/29/96	15:21:11	449.0463	17.589	449.001	7.54	0.63
8/29/96	15:26:11	454.0463	17.552	454.001	7.50	0.62
8/29/96	15:31:11	459.0463	17.515	459.001	7.47	0.62
8/29/96	15:36:11	464.0463	17.481	464.001	7.43	0.62
8/29/96	15:41:11	469.0463	17.441	469.001	7.39	0.61
8/29/96	15:46:11	474.0463	17.407	474.001	7.36	0.61
8/29/96	15:51:11	479.0463	17.37	479.001	7.32	0.61
8/29/96	15:56:11	484.0463	17.335	484.001	7.29	0.60
8/29/96	16:01:11	489.0463	17.298	489.001	7.25	0.60
8/29/96	16:06:11	494.0463	17.264	494.001	7.21	0.60
8/29/96	16:11:11	499.0463	17.229	499.001	7.18	0.60
8/29/96	16:16:11	504.0463	17.192	504.001	7.14	0.59
8/29/96	16:21:11	509.0463	17.16	509.001	7.11	0.59
8/29/96	16:26:11	514.0463	17.123	514.001	7.07	0.59
8/29/96	16:31:11	519.0463	17.088	519.001	7.04	0.58
8/29/96	16:36:11	524.0463	17.056	524.001	7.01	0.58
8/29/96	16:41:11	529.0463	17.024	529.001	6.97	0.58
8/29/96	16:46:11	534.0463	16.989	534.001	6.94	0.58
8/29/96	16:51:11	539.0463	16.955	539.001	6.91	0.57
8/29/96	16:56:11	544.0463	16.92	544.001	6.87	0.57
8/29/96	17:01:11	549.0463	16.888	549.001	6.84	0.57
8/29/96	17:06:11	554.0463	16.853	554.001	6.80	0.56
8/29/96	17:11:11	559.0463	16.821	559.001	6.77	0.56
8/29/96	17:16:11	564.0463	16.786	564.001	6.74	0.56
8/29/96	17:21:11	569.0463	16.752	569.001	6.70	0.56
8/29/96	17:26:11	574.0463	16.719	574.001	6.67	0.55
8/29/96	17:31:11	579.0463	16.687	579.001	6.64	0.55
8/29/96	17:36:11	584.0463	16.652	584.001	6.60	0.55
8/29/96	17:41:11	589.0463	16.616	589.001	6.57	0.54
8/29/96	17:46:11	594.0463	16.579	594.001	6.53	0.54
8/29/96	17:51:11	599.0463	16.539	599.001	6.49	0.54
8/29/96	17:56:11	604.0463	16.507	604.001	6.46	0.54
8/29/96	18:01:11	609.0463	16.47	609.001	6.42	0.53

HVORSLEV SLUG TEST ANALYSIS RISING HEAD TEST MW-10R

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet)
 R_e = equivalent radius (feet)
 L_e = length of screened interval (feet)
 t = time (minutes)
 h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS
$r_c =$	0.08	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> $K = 1.76E-04 \text{ cm/sec}$ $K = 4.98E-01 \text{ ft/day}$ </div>
$R_e =$	0.15	
$L_e =$	10	
$t_1 =$	0	
$t_2 =$	10	
$h_1/h_0 =$	1.00	
$h_2/h_0 =$	0.095	



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 08/29/96

Analysis By: SDM
 Checked By: FG
 Analysis Date: 1/17/97

RISING HEAD TEST MW-10R

WELL NO. MW-10R

DATE 8/29/96
 INITIAL DEPTH TO WATER 6.79 FEET (btoc)
 CASING DIAMETER 2 INCHES
 SAND DIAMETER 3.5 INCHES
 TOP OF OPEN INTERVAL 55.5 FEET (btoc)
 BOTTOM OF OPEN INTERVAL 65.5 FEET (btoc)
 SATURATED THICKNESS 100 FEET
 WATER TABLE TO BOTTOM OF SCREEN 58.71 FEET
 EQUIVALENT DIAMETER 2.54 INCHES
 OPEN INTERVAL LENGTH 10 FEET
 STATIC IN SCREEN? N
 MAX. HEAD CHANGE 16.21 FEET
 MAX. HEAD IN SCREEN? N

DATE	TIME	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
	(HR:M:S)					
8/29/96	18:15:24	0.0000	22.996	0.000	16.21	1.00
8/29/96	18:15:24	0.0050	22.968	0.005	16.18	1.00
8/29/96	18:15:24	0.0100	22.954	0.010	16.16	1.00
8/29/96	18:15:24	0.0150	22.936	0.015	16.15	1.00
8/29/96	18:15:25	0.0200	22.922	0.020	16.13	1.00
8/29/96	18:15:25	0.0250	22.894	0.025	16.10	0.99
8/29/96	18:15:25	0.0300	22.871	0.030	16.08	0.99
8/29/96	18:15:26	0.0350	22.853	0.035	16.06	0.99
8/29/96	18:15:26	0.0400	22.830	0.040	16.04	0.99
8/29/96	18:15:26	0.0450	22.816	0.045	16.03	0.99
8/29/96	18:15:27	0.0500	22.805	0.050	16.02	0.99
8/29/96	18:15:27	0.0550	22.772	0.055	15.98	0.99
8/29/96	18:15:27	0.0600	22.758	0.060	15.97	0.99
8/29/96	18:15:27	0.0650	22.731	0.065	15.94	0.98
8/29/96	18:15:28	0.0700	22.708	0.070	15.92	0.98
8/29/96	18:15:28	0.0750	22.694	0.075	15.90	0.98
8/29/96	18:15:28	0.0800	22.648	0.080	15.86	0.98
8/29/96	18:15:29	0.0850	22.632	0.085	15.84	0.98
8/29/96	18:15:29	0.0900	22.613	0.090	15.82	0.98
8/29/96	18:15:29	0.0950	22.599	0.095	15.81	0.98
8/29/96	18:15:30	0.1000	22.581	0.100	15.79	0.97
8/29/96	18:15:30	0.1058	22.558	0.106	15.77	0.97
8/29/96	18:15:30	0.1120	22.530	0.112	15.74	0.97
8/29/96	18:15:31	0.1185	22.507	0.119	15.72	0.97
8/29/96	18:15:31	0.1255	22.479	0.126	15.69	0.97
8/29/96	18:15:31	0.1328	22.449	0.133	15.66	0.97
8/29/96	18:15:32	0.1407	22.417	0.141	15.63	0.96
8/29/96	18:15:32	0.1490	22.362	0.149	15.57	0.96
8/29/96	18:15:33	0.1578	22.329	0.158	15.54	0.96
8/29/96	18:15:34	0.1672	22.297	0.167	15.51	0.96
8/29/96	18:15:34	0.1770	22.258	0.177	15.47	0.95
8/29/96	18:15:35	0.1875	22.216	0.188	15.43	0.95
8/29/96	18:15:35	0.1985	22.175	0.199	15.39	0.95
8/29/96	18:15:36	0.2102	22.129	0.210	15.34	0.95
8/29/96	18:15:37	0.2227	22.078	0.223	15.29	0.94
8/29/96	18:15:38	0.2358	22.029	0.236	15.24	0.94
8/29/96	18:15:38	0.2498	21.974	0.250	15.18	0.94
8/29/96	18:15:39	0.2647	21.914	0.265	15.12	0.93

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/29/96	18:15:40	0.2803	21.856	0.280	15.07	0.93
8/29/96	18:15:41	0.2970	21.792	0.297	15.00	0.93
8/29/96	18:15:42	0.3147	21.727	0.315	14.94	0.92
8/29/96	18:15:44	0.3333	21.651	0.333	14.86	0.92
8/29/96	18:15:45	0.3532	21.577	0.353	14.79	0.91
8/29/96	18:15:46	0.3742	21.497	0.374	14.71	0.91
8/29/96	18:15:47	0.3963	21.414	0.396	14.62	0.90
8/29/96	18:15:49	0.4198	21.324	0.420	14.53	0.90
8/29/96	18:15:50	0.4447	21.236	0.445	14.45	0.89
8/29/96	18:15:52	0.4697	21.144	0.470	14.35	0.89
8/29/96	18:15:53	0.4963	21.049	0.496	14.26	0.88
8/29/96	18:15:55	0.5247	20.948	0.525	14.16	0.87
8/29/96	18:15:57	0.5547	20.844	0.555	14.05	0.87
8/29/96	18:15:59	0.5863	20.731	0.586	13.94	0.86
8/29/96	18:16:01	0.6213	20.611	0.621	13.82	0.85
8/29/96	18:16:03	0.6580	20.484	0.658	13.69	0.84
8/29/96	18:16:05	0.6963	20.357	0.696	13.57	0.84
8/29/96	18:16:08	0.7380	20.214	0.738	13.42	0.83
8/29/96	18:16:10	0.7813	20.073	0.781	13.28	0.82
8/29/96	18:16:13	0.8280	19.919	0.828	13.13	0.81
8/29/96	18:16:16	0.8763	19.764	0.876	12.97	0.80
8/29/96	18:16:19	0.9280	19.598	0.928	12.81	0.79
8/29/96	18:16:22	0.9830	19.430	0.983	12.64	0.78
8/29/96	18:16:26	1.0413	19.252	1.041	12.46	0.77
8/29/96	18:16:30	1.1030	19.065	1.103	12.28	0.76
8/29/96	18:16:34	1.1680	18.879	1.168	12.09	0.75
8/29/96	18:16:38	1.2380	18.673	1.238	11.88	0.73
8/29/96	18:16:42	1.3113	18.459	1.311	11.67	0.72
8/29/96	18:16:47	1.3897	18.240	1.390	11.45	0.71
8/29/96	18:16:52	1.4730	18.016	1.473	11.23	0.69
8/29/96	18:16:57	1.5613	17.783	1.561	10.99	0.68
8/29/96	18:17:03	1.6547	17.543	1.655	10.75	0.66
8/29/96	18:17:09	1.7530	17.296	1.753	10.51	0.65
8/29/96	18:17:15	1.8580	17.045	1.858	10.26	0.63
8/29/96	18:17:22	1.9680	16.784	1.968	9.99	0.62
8/29/96	18:17:29	2.0847	16.510	2.085	9.72	0.60
8/29/96	18:17:36	2.2097	16.237	2.210	9.45	0.58
8/29/96	18:17:44	2.3413	15.954	2.341	9.16	0.57
8/29/96	18:17:52	2.4813	15.670	2.481	8.88	0.55
8/29/96	18:18:01	2.6297	15.375	2.630	8.59	0.53
8/29/96	18:18:11	2.7863	15.063	2.786	8.27	0.51
8/29/96	18:18:21	2.9530	14.757	2.953	7.97	0.49
8/29/96	18:18:31	3.1297	14.447	3.130	7.66	0.47
8/29/96	18:18:42	3.3163	14.136	3.316	7.35	0.45
8/29/96	18:18:54	3.5147	13.822	3.515	7.03	0.43
8/29/96	18:19:07	3.7247	13.506	3.725	6.72	0.41
8/29/96	18:19:20	3.9463	13.195	3.946	6.41	0.40
8/29/96	18:19:34	4.1813	12.886	4.181	6.10	0.38
8/29/96	18:19:49	4.4297	12.574	4.430	5.78	0.36
8/29/96	18:20:05	4.6930	12.268	4.693	5.48	0.34
8/29/96	18:20:22	4.9730	11.961	4.973	5.17	0.32
8/29/96	18:20:40	5.2697	11.666	5.270	4.88	0.30
8/29/96	18:20:58	5.5830	11.373	5.583	4.58	0.28
8/29/96	18:21:18	5.9147	11.089	5.915	4.30	0.27
8/29/96	18:21:39	6.2663	10.814	6.266	4.02	0.25
8/29/96	18:22:02	6.6397	10.545	6.640	3.76	0.23

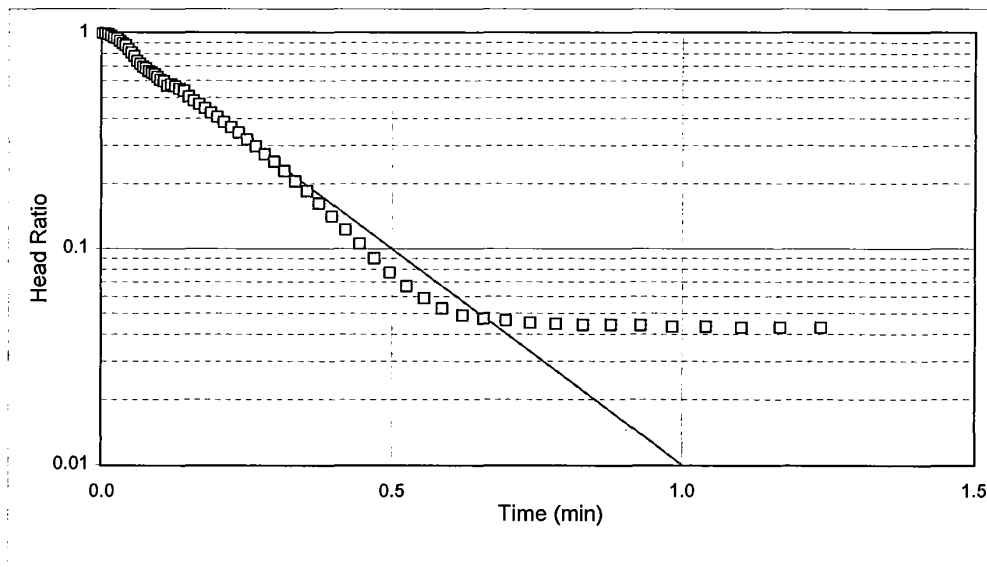
DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/29/96	18:22:26	7.0347	10.293	7.035	3.50	0.22
8/29/96	18:22:51	7.4530	10.046	7.453	3.26	0.20
8/29/96	18:23:17	7.8963	9.809	7.896	3.02	0.19
8/29/96	18:23:45	8.3663	9.585	8.366	2.80	0.17
8/29/96	18:24:15	8.8647	9.375	8.865	2.59	0.16
8/29/96	18:24:47	9.3913	9.177	9.391	2.39	0.15
8/29/96	18:25:20	9.9497	8.994	9.950	2.20	0.14
8/29/96	18:25:56	10.5413	8.821	10.541	2.03	0.13
8/29/96	18:26:34	11.1680	8.651	11.168	1.86	0.11
8/29/96	18:27:13	11.8313	8.492	11.831	1.70	0.11
8/29/96	18:27:56	12.5347	8.344	12.535	1.55	0.10
8/29/96	18:28:40	13.2797	8.217	13.280	1.43	0.09
8/29/96	18:29:28	14.0697	8.088	14.070	1.30	0.08
8/29/96	18:30:18	14.9063	7.980	14.906	1.19	0.07
8/29/96	18:31:11	15.7913	7.869	15.791	1.08	0.07
8/29/96	18:32:07	16.7297	7.770	16.730	0.98	0.06
8/29/96	18:33:07	17.7230	7.677	17.723	0.89	0.05
8/29/96	18:34:10	18.7763	7.594	18.776	0.80	0.05
8/29/96	18:35:17	19.8913	7.516	19.891	0.73	0.04
8/29/96	18:36:28	21.0730	7.449	21.073	0.66	0.04
8/29/96	18:37:43	22.3247	7.384	22.325	0.59	0.04
8/29/96	18:39:02	23.6497	7.324	23.650	0.53	0.03
8/29/96	18:40:27	25.0547	7.269	25.055	0.48	0.03
8/29/96	18:41:56	26.5430	7.221	26.543	0.43	0.03
8/29/96	18:43:31	28.1180	7.175	28.118	0.39	0.02
8/29/96	18:45:11	29.7863	7.138	29.786	0.35	0.02
8/29/96	18:46:57	31.5547	7.101	31.555	0.31	0.02
8/29/96	18:48:49	33.4280	7.064	33.428	0.27	0.02
8/29/96	18:50:48	35.4113	7.036	35.411	0.25	0.02
8/29/96	18:52:54	37.5130	7.008	37.513	0.22	0.01
8/29/96	18:55:08	39.7397	6.985	39.740	0.20	0.01
8/29/96	18:57:29	42.0980	6.962	42.098	0.17	0.01
8/29/96	18:59:59	44.5963	6.946	44.596	0.16	0.01
8/29/96	19:02:38	47.2430	6.932	47.243	0.14	0.01
8/29/96	19:05:26	50.0463	6.914	50.046	0.12	0.01
8/29/96	19:08:24	53.0147	6.900	53.015	0.11	0.01

**HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST MW-11R TEST 1**

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet)
 R_e = equivalent radius (feet)
 L_e = length of screened interval (feet)
 t = time (minutes)
 h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS	
$r_c =$	0.15	$K =$	1.05E-02 cm/sec
$R_e =$	0.15	$K =$	2.98E+01 ft/day
$L_e =$	10		
$t_1 =$	0		
$t_2 =$	1		
$h_1/h_0 =$	1.00		
$h_2/h_0 =$	0.01		



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 08/27/96

Analysis By: SDM
 Checked By: FG
 Analysis Date: 1/20/97

RISING HEAD TEST MW-11R TEST 1
WELL NO. W-11R TES

DATE	8/27/96	
INITIAL DEPTH TO WATER	5.51	FEET (btoc)
CASING DIAMETER	3.5	INCHES
SAND DIAMETER	3.5	INCHES
TOP OF OPEN INTERVAL	48	FEET (btoc)
BOTTOM OF OPEN INTERVAL	58	FEET (btoc)
SATURATED THICKNESS	10	FEET
WATER TABLE TO BOTTOM OF SCREEN	52.49	FEET
EQUIVALENT DIAMETER	3.50	INCHES
OPEN INTERVAL LENGTH	10	FEET
STATIC IN SCREEN?	N	
MAX. HEAD CHANGE	10.65	FEET
MAX. HEAD IN SCREEN?	N	

DATE	TIME	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
	(HR:M:S)					
8/27/96	10:30:15	0.000	16.161	0.000	10.65	1.00
8/27/96	10:30:15	0.005	16.114	0.005	10.60	1.00
8/27/96	10:30:15	0.010	16.020	0.010	10.51	0.99
8/27/96	10:30:15	0.015	15.879	0.015	10.37	0.97
8/27/96	10:30:16	0.020	15.676	0.020	10.17	0.95
8/27/96	10:30:16	0.025	15.591	0.025	10.08	0.95
8/27/96	10:30:16	0.030	15.316	0.030	9.81	0.92
8/27/96	10:30:17	0.035	15.072	0.035	9.56	0.90
8/27/96	10:30:17	0.040	14.850	0.040	9.34	0.88
8/27/96	10:30:17	0.045	14.454	0.045	8.94	0.84
8/27/96	10:30:18	0.050	14.165	0.050	8.66	0.81
8/27/96	10:30:18	0.055	13.835	0.055	8.33	0.78
8/27/96	10:30:18	0.060	13.429	0.060	7.92	0.74
8/27/96	10:30:18	0.065	13.185	0.065	7.68	0.72
8/27/96	10:30:19	0.070	12.950	0.070	7.44	0.70
8/27/96	10:30:19	0.075	12.816	0.075	7.31	0.69
8/27/96	10:30:19	0.080	12.594	0.080	7.08	0.67
8/27/96	10:30:20	0.085	12.463	0.085	6.95	0.65
8/27/96	10:30:20	0.090	12.373	0.090	6.86	0.64
8/27/96	10:30:20	0.095	12.177	0.095	6.67	0.63
8/27/96	10:30:21	0.100	11.979	0.100	6.47	0.61
8/27/96	10:30:21	0.106	11.865	0.106	6.36	0.60
8/27/96	10:30:21	0.112	11.568	0.112	6.06	0.57
8/27/96	10:30:22	0.119	11.672	0.119	6.16	0.58
8/27/96	10:30:22	0.126	11.549	0.126	6.04	0.57
8/27/96	10:30:22	0.133	11.379	0.133	5.87	0.55
8/27/96	10:30:23	0.141	11.247	0.141	5.74	0.54
8/27/96	10:30:23	0.149	10.922	0.149	5.41	0.51
8/27/96	10:30:24	0.158	10.673	0.158	5.16	0.48
8/27/96	10:30:25	0.167	10.484	0.167	4.97	0.47
8/27/96	10:30:25	0.177	10.276	0.177	4.77	0.45
8/27/96	10:30:26	0.188	10.064	0.188	4.55	0.43
8/27/96	10:30:26	0.199	9.852	0.199	4.34	0.41
8/27/96	10:30:27	0.210	9.626	0.210	4.12	0.39
8/27/96	10:30:28	0.223	9.409	0.223	3.90	0.37
8/27/96	10:30:29	0.236	9.183	0.236	3.67	0.34
8/27/96	10:30:29	0.250	8.915	0.250	3.41	0.32
8/27/96	10:30:30	0.265	8.685	0.265	3.18	0.30
8/27/96	10:30:31	0.280	8.431	0.280	2.92	0.27

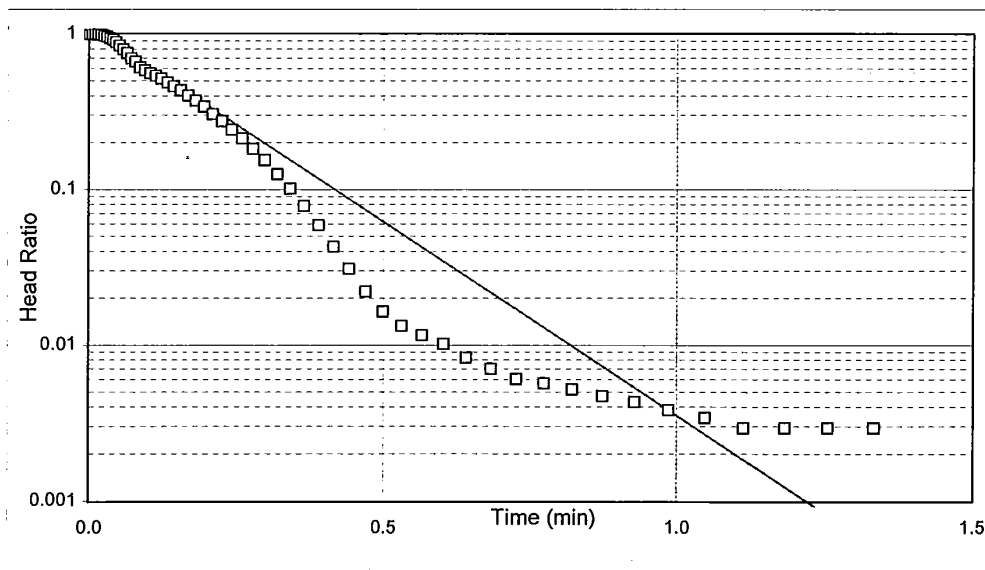
DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/27/96	10:30:32	0.297	8.200	0.297	2.69	0.25
8/27/96	10:30:33	0.315	7.946	0.315	2.44	0.23
8/27/96	10:30:35	0.333	7.695	0.333	2.19	0.21
8/27/96	10:30:36	0.353	7.478	0.353	1.97	0.18
8/27/96	10:30:37	0.374	7.238	0.374	1.73	0.16
8/27/96	10:30:38	0.396	7.012	0.396	1.50	0.14
8/27/96	10:30:40	0.420	6.816	0.420	1.31	0.12
8/27/96	10:30:41	0.445	6.632	0.445	1.12	0.11
8/27/96	10:30:43	0.470	6.472	0.470	0.96	0.09
8/27/96	10:30:44	0.496	6.336	0.496	0.83	0.08
8/27/96	10:30:46	0.525	6.223	0.525	0.71	0.07
8/27/96	10:30:48	0.555	6.138	0.555	0.63	0.06
8/27/96	10:30:50	0.586	6.073	0.586	0.56	0.05
8/27/96	10:30:52	0.621	6.034	0.621	0.52	0.05
8/27/96	10:30:54	0.658	6.016	0.658	0.51	0.05
8/27/96	10:30:56	0.696	6.007	0.696	0.50	0.05
8/27/96	10:30:59	0.738	5.993	0.738	0.48	0.05
8/27/96	10:31:01	0.781	5.988	0.781	0.48	0.04
8/27/96	10:31:04	0.828	5.983	0.828	0.47	0.04
8/27/96	10:31:07	0.876	5.983	0.876	0.47	0.04
8/27/96	10:31:10	0.928	5.979	0.928	0.47	0.04
8/27/96	10:31:13	0.983	5.974	0.983	0.46	0.04
8/27/96	10:31:17	1.041	5.974	1.041	0.46	0.04
8/27/96	10:31:21	1.103	5.970	1.103	0.46	0.04
8/27/96	10:31:25	1.168	5.970	1.168	0.46	0.04
8/27/96	10:31:29	1.238	5.970	1.238	0.46	0.04

**HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST MW-11R-TEST 2**

$$K = \frac{r_c'}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet)
 R_e = equivalent radius (feet)
 L_e = length of screened interval (feet)
 t = time (minutes)
 h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS
$r_c =$	0.15	
$R_e =$	0.15	
$L_e =$	10	
$t_1 =$	0	
$t_2 =$	1.5	
$h_1/h_0 =$	1.10	
$h_2/h_0 =$	0.0002	
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> $K = 1.31E-02 \text{ cm/sec}$ $K = 3.72E+01 \text{ ft/day}$ </div>



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 08/27/96

Analysis By: SDM
 Checked By: FG
 Analysis Date: 1/17/97

RISING HEAD TEST MW-11R-TEST 2

WELL NO. MW-11R

DATE 8/27/96

INITIAL DEPTH TO WATER 5.97 FEET (btoc)

CASING DIAMETER 3.5 INCHES

SAND DIAMETER 3.5 INCHES

TOP OF OPEN INTERVAL 48 FEET (btoc)

BOTTOM OF OPEN INTERVAL 58 FEET (btoc)

SATURATED THICKNESS 10 FEET

WATER TABLE TO BOTTOM OF SCREEN 52.03 FEET

EQUIVALENT DIAMETER 3.50 INCHES

OPEN INTERVAL LENGTH 10 FEET

STATIC IN SCREEN? N

MAX. HEAD CHANGE 10.18 FEET

MAX. HEAD IN SCREEN? N

DATE	TIME	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
	(HR:M:S)					
8/27/96	10:47:14	0.000	16.15		10.18	
8/27/96	10:47:14	0.005	16.16		10.19	
8/27/96	10:47:14	0.010	16.16		10.19	
8/27/96	10:47:14	0.015	16.16		10.19	
8/27/96	10:47:15	0.020	16.16		10.19	
8/27/96	10:47:15	0.025	16.16		10.19	
8/27/96	10:47:15	0.030	16.16		10.19	
8/27/96	10:47:16	0.035	16.16		10.19	
8/27/96	10:47:16	0.040	16.16		10.19	
8/27/96	10:47:16	0.045	16.16		10.19	
8/27/96	10:47:17	0.050	16.16		10.19	
8/27/96	10:47:17	0.055	16.16	0.000	10.19	1.00
8/27/96	10:47:17	0.060	16.15	0.005	10.18	1.00
8/27/96	10:47:17	0.065	16.15	0.010	10.18	1.00
8/27/96	10:47:18	0.070	16.12	0.015	10.15	1.00
8/27/96	10:47:18	0.075	16.05	0.020	10.08	0.99
8/27/96	10:47:18	0.080	15.96	0.025	9.99	0.98
8/27/96	10:47:19	0.085	15.80	0.030	9.83	0.97
8/27/96	10:47:19	0.090	15.58	0.035	9.61	0.94
8/27/96	10:47:19	0.095	15.37	0.040	9.40	0.92
8/27/96	10:47:20	0.100	15.02	0.045	9.05	0.89
8/27/96	10:47:20	0.106	14.60	0.051	8.63	0.85
8/27/96	10:47:20	0.112	14.09	0.057	8.12	0.80
8/27/96	10:47:21	0.119	13.65	0.064	7.68	0.75
8/27/96	10:47:21	0.126	13.08	0.071	7.11	0.70
8/27/96	10:47:21	0.133	12.77	0.078	6.80	0.67
8/27/96	10:47:22	0.141	12.21	0.086	6.24	0.61
8/27/96	10:47:22	0.149	11.93	0.094	5.96	0.59
8/27/96	10:47:23	0.158	11.68	0.103	5.71	0.56
8/27/96	10:47:24	0.167	11.47	0.112	5.50	0.54
8/27/96	10:47:24	0.177	11.25	0.122	5.28	0.52
8/27/96	10:47:25	0.188	10.96	0.133	4.99	0.49
8/27/96	10:47:25	0.199	10.67	0.144	4.70	0.46
8/27/96	10:47:26	0.210	10.41	0.155	4.44	0.44
8/27/96	10:47:27	0.223	10.08	0.168	4.11	0.40
8/27/96	10:47:28	0.236	9.79	0.181	3.82	0.38
8/27/96	10:47:28	0.250	9.45	0.195	3.48	0.34
8/27/96	10:47:29	0.265	9.08	0.210	3.11	0.31

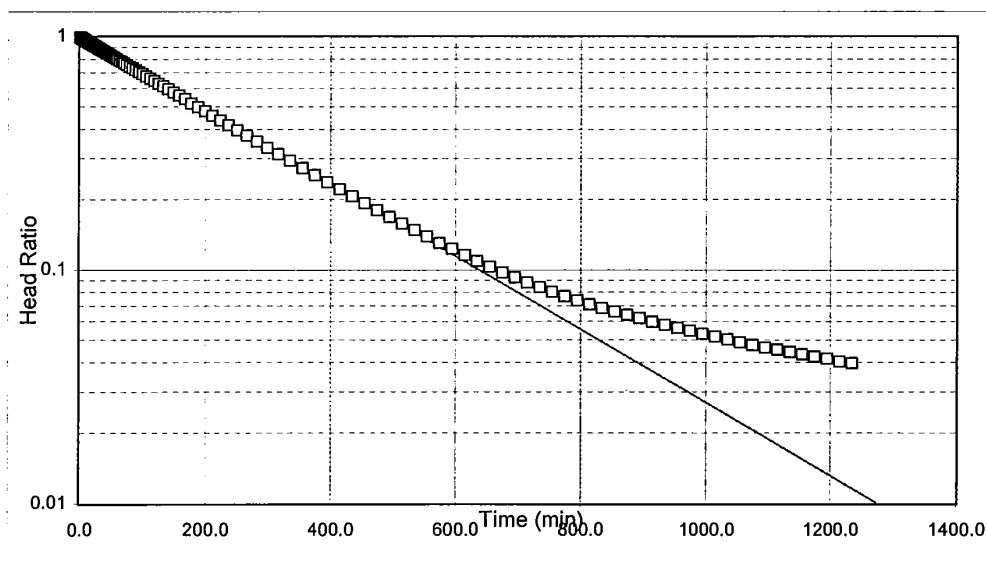
DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/27/96	10:47:30	0.280	8.78	0.225	2.81	0.28
8/27/96	10:47:31	0.297	8.45	0.242	2.48	0.24
8/27/96	10:47:32	0.315	8.15	0.260	2.18	0.21
8/27/96	10:47:34	0.333	7.83	0.278	1.86	0.18
8/27/96	10:47:35	0.353	7.55	0.298	1.58	0.15
8/27/96	10:47:36	0.374	7.25	0.319	1.28	0.13
8/27/96	10:47:37	0.396	7.00	0.341	1.03	0.10
8/27/96	10:47:39	0.420	6.77	0.365	0.80	0.08
8/27/96	10:47:40	0.445	6.57	0.390	0.60	0.06
8/27/96	10:47:42	0.470	6.41	0.415	0.44	0.04
8/27/96	10:47:43	0.496	6.29	0.441	0.32	0.03
8/27/96	10:47:45	0.525	6.20	0.470	0.23	0.02
8/27/96	10:47:47	0.555	6.14	0.500	0.17	0.02
8/27/96	10:47:49	0.586	6.11	0.531	0.14	0.01
8/27/96	10:47:51	0.621	6.09	0.566	0.12	0.01
8/27/96	10:47:53	0.658	6.07	0.603	0.10	0.01
8/27/96	10:47:55	0.696	6.06	0.641	0.09	0.01
8/27/96	10:47:58	0.738	6.04	0.683	0.07	0.01
8/27/96	10:48:00	0.781	6.03	0.726	0.06	0.01
8/27/96	10:48:03	0.828	6.03	0.773	0.06	0.01
8/27/96	10:48:06	0.876	6.02	0.821	0.05	0.01
8/27/96	10:48:09	0.928	6.02	0.873	0.05	0.00
8/27/96	10:48:12	0.983	6.01	0.928	0.04	0.00
8/27/96	10:48:16	1.041	6.01	0.986	0.04	0.00
8/27/96	10:48:20	1.103	6.01	1.048	0.04	0.00
8/27/96	10:48:24	1.168	6.00	1.113	0.03	0.00
8/27/96	10:48:28	1.238	6.00	1.183	0.03	0.00
8/27/96	10:48:32	1.311	6.00	1.256	0.03	0.00
8/27/96	10:48:37	1.390	6.00	1.335	0.03	0.00

**HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST MW-14D**

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet)
 R_e = equivalent radius (feet)
 L_e = length of screened interval (feet)
 t = time (minutes)
 h_t = head at time t (feet)

INPUT PARAMETERS	RESULTS
$r_c = 0.17$	
$R_e = 0.33$	
$L_e = 14$	
$t_1 = 0$	
$t_2 = 1276$	
$h_1/h_0 = 1.00$	
$h_2/h_0 = 0.01$	
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> $K = 6.80E-06 \text{ cm/sec}$ $K = 1.93E-02 \text{ ft/day}$ </div>



Project Name: 216 Pateson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 08/29/96

Analysis By: SDM
 Checked By: FG
 Analysis Date: 1/17/97

RISING HEAD TEST MW-14D

WELL NO. MW-14D

DATE 8/29/96
 INITIAL DEPTH TO WATER 0.92 FEET (btoc)
 CASING DIAMETER 4 INCHES
 SAND DIAMETER 8 INCHES
 TOP OF OPEN INTERVAL 27 FEET (btoc)
 BOTTOM OF OPEN INTERVAL 41 FEET (btoc)
 SATURATED THICKNESS 13 FEET
 WATER TABLE TO BOTTOM OF SCREEN 40.08 FEET
 EQUIVALENT DIAMETER 5.51 INCHES
 OPEN INTERVAL LENGTH 14 FEET
 STATIC IN SCREEN? N
 MAX. HEAD CHANGE 17.04 FEET
 MAX. HEAD IN SCREEN? N

DATE	TIME	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
	(HR:M:S)					
8/27/96	15:27:39	0.000	17.961	0.000	17.04	1.00
8/27/96	15:27:39	0.005	17.963	0.005	17.04	1.00
8/27/96	15:27:39	0.010	17.961	0.010	17.04	1.00
8/27/96	15:27:39	0.015	17.961	0.015	17.04	1.00
8/27/96	15:27:40	0.020	17.961	0.020	17.04	1.00
8/27/96	15:27:40	0.025	17.961	0.025	17.04	1.00
8/27/96	15:27:40	0.030	17.959	0.030	17.04	1.00
8/27/96	15:27:41	0.035	17.956	0.035	17.04	1.00
8/27/96	15:27:41	0.040	17.956	0.040	17.04	1.00
8/27/96	15:27:41	0.045	17.956	0.045	17.04	1.00
8/27/96	15:27:42	0.050	17.954	0.050	17.03	1.00
8/27/96	15:27:42	0.055	17.954	0.055	17.03	1.00
8/27/96	15:27:42	0.060	17.954	0.060	17.03	1.00
8/27/96	15:27:42	0.065	17.954	0.065	17.03	1.00
8/27/96	15:27:43	0.070	17.954	0.070	17.03	1.00
8/27/96	15:27:43	0.075	17.956	0.075	17.04	1.00
8/27/96	15:27:43	0.080	17.952	0.080	17.03	1.00
8/27/96	15:27:44	0.085	17.952	0.085	17.03	1.00
8/27/96	15:27:44	0.090	17.950	0.090	17.03	1.00
8/27/96	15:27:44	0.095	17.950	0.095	17.03	1.00
8/27/96	15:27:45	0.100	17.950	0.100	17.03	1.00
8/27/96	15:27:45	0.106	17.950	0.106	17.03	1.00
8/27/96	15:27:45	0.112	17.947	0.112	17.03	1.00
8/27/96	15:27:46	0.119	17.947	0.119	17.03	1.00
8/27/96	15:27:46	0.126	17.947	0.126	17.03	1.00
8/27/96	15:27:46	0.133	17.945	0.133	17.03	1.00
8/27/96	15:27:47	0.141	17.943	0.141	17.02	1.00
8/27/96	15:27:47	0.149	17.943	0.149	17.02	1.00
8/27/96	15:27:48	0.158	17.940	0.158	17.02	1.00
8/27/96	15:27:49	0.167	17.940	0.167	17.02	1.00
8/27/96	15:27:49	0.177	17.938	0.177	17.02	1.00
8/27/96	15:27:50	0.188	17.938	0.188	17.02	1.00
8/27/96	15:27:50	0.199	17.938	0.199	17.02	1.00
8/27/96	15:27:51	0.210	17.936	0.210	17.02	1.00
8/27/96	15:27:52	0.223	17.936	0.223	17.02	1.00
8/27/96	15:27:53	0.236	17.933	0.236	17.01	1.00
8/27/96	15:27:53	0.250	17.931	0.250	17.01	1.00
8/27/96	15:27:54	0.265	17.931	0.265	17.01	1.00
8/27/96	15:27:55	0.280	17.929	0.280	17.01	1.00

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/27/96	15:27:56	0.297	17.927	0.297	17.01	1.00
8/27/96	15:27:57	0.315	17.924	0.315	17.00	1.00
8/27/96	15:27:59	0.333	17.924	0.333	17.00	1.00
8/27/96	15:28:00	0.353	17.922	0.353	17.00	1.00
8/27/96	15:28:01	0.374	17.920	0.374	17.00	1.00
8/27/96	15:28:02	0.396	17.917	0.396	17.00	1.00
8/27/96	15:28:04	0.420	17.915	0.420	17.00	1.00
8/27/96	15:28:05	0.445	17.913	0.445	16.99	1.00
8/27/96	15:28:07	0.470	17.910	0.470	16.99	1.00
8/27/96	15:28:08	0.496	17.908	0.496	16.99	1.00
8/27/96	15:28:10	0.525	17.906	0.525	16.99	1.00
8/27/96	15:28:12	0.555	17.903	0.555	16.98	1.00
8/27/96	15:28:14	0.586	17.901	0.586	16.98	1.00
8/27/96	15:28:16	0.621	17.897	0.621	16.98	1.00
8/27/96	15:28:18	0.658	17.894	0.658	16.97	1.00
8/27/96	15:28:20	0.696	17.892	0.696	16.97	1.00
8/27/96	15:28:23	0.738	17.890	0.738	16.97	1.00
8/27/96	15:28:25	0.781	17.883	0.781	16.96	1.00
8/27/96	15:28:28	0.828	17.880	0.828	16.96	1.00
8/27/96	15:28:31	0.876	17.878	0.876	16.96	1.00
8/27/96	15:28:34	0.928	17.871	0.928	16.95	0.99
8/27/96	15:28:37	0.983	17.869	0.983	16.95	0.99
8/27/96	15:28:41	1.041	17.864	1.041	16.94	0.99
8/27/96	15:28:45	1.103	17.860	1.103	16.94	0.99
8/27/96	15:28:49	1.168	17.855	1.168	16.94	0.99
8/27/96	15:28:53	1.238	17.850	1.238	16.93	0.99
8/27/96	15:28:57	1.311	17.846	1.311	16.93	0.99
8/27/96	15:29:02	1.390	17.839	1.390	16.92	0.99
8/27/96	15:29:07	1.473	17.834	1.473	16.91	0.99
8/27/96	15:29:12	1.561	17.827	1.561	16.91	0.99
8/27/96	15:29:18	1.655	17.820	1.655	16.90	0.99
8/27/96	15:29:24	1.753	17.813	1.753	16.89	0.99
8/27/96	15:29:30	1.858	17.807	1.858	16.89	0.99
8/27/96	15:29:37	1.968	17.797	1.968	16.88	0.99
8/27/96	15:29:44	2.085	17.790	2.085	16.87	0.99
8/27/96	15:29:51	2.210	17.783	2.210	16.86	0.99
8/27/96	15:29:59	2.341	17.774	2.341	16.85	0.99
8/27/96	15:30:07	2.481	17.765	2.481	16.85	0.99
8/27/96	15:30:16	2.630	17.754	2.630	16.83	0.99
8/27/96	15:30:26	2.786	17.744	2.786	16.82	0.99
8/27/96	15:30:36	2.953	17.730	2.953	16.81	0.99
8/27/96	15:30:46	3.130	17.721	3.130	16.80	0.99
8/27/96	15:30:57	3.316	17.707	3.316	16.79	0.99
8/27/96	15:31:09	3.515	17.696	3.515	16.78	0.98
8/27/96	15:31:22	3.725	17.682	3.725	16.76	0.98
8/27/96	15:31:35	3.946	17.668	3.946	16.75	0.98
8/27/96	15:31:49	4.181	17.652	4.181	16.73	0.98
8/27/96	15:32:04	4.430	17.638	4.430	16.72	0.98
8/27/96	15:32:20	4.693	17.620	4.693	16.70	0.98
8/27/96	15:32:37	4.973	17.604	4.973	16.68	0.98
8/27/96	15:32:55	5.270	17.585	5.270	16.67	0.98
8/27/96	15:33:13	5.583	17.564	5.583	16.64	0.98
8/27/96	15:33:33	5.915	17.544	5.915	16.62	0.98
8/27/96	15:33:54	6.266	17.521	6.266	16.60	0.97
8/27/96	15:34:17	6.640	17.497	6.640	16.58	0.97
8/27/96	15:34:41	7.035	17.474	7.035	16.55	0.97
8/27/96	15:35:06	7.453	17.447	7.453	16.53	0.97

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/27/96	15:35:32	7.896	17.419	7.896	16.50	0.97
8/27/96	15:36:00	8.366	17.391	8.366	16.47	0.97
8/27/96	15:36:30	8.865	17.361	8.865	16.44	0.96
8/27/96	15:37:02	9.391	17.329	9.391	16.41	0.96
8/27/96	15:37:35	9.950	17.290	9.950	16.37	0.96
8/27/96	15:38:11	10.541	17.255	10.541	16.34	0.96
8/27/96	15:38:49	11.168	17.216	11.168	16.30	0.96
8/27/96	15:39:28	11.831	17.179	11.831	16.26	0.95
8/27/96	15:40:11	12.535	17.135	12.535	16.22	0.95
8/27/96	15:40:55	13.280	17.091	13.280	16.17	0.95
8/27/96	15:41:43	14.070	17.045	14.070	16.13	0.95
8/27/96	15:42:33	14.906	16.995	14.906	16.08	0.94
8/27/96	15:43:26	15.791	16.942	15.791	16.02	0.94
8/27/96	15:44:22	16.730	16.889	16.730	15.97	0.94
8/27/96	15:45:22	17.723	16.831	17.723	15.91	0.93
8/27/96	15:46:25	18.776	16.769	18.776	15.85	0.93
8/27/96	15:47:32	19.891	16.704	19.891	15.78	0.93
8/27/96	15:48:43	21.073	16.637	21.073	15.72	0.92
8/27/96	15:49:58	22.325	16.563	22.325	15.64	0.92
8/27/96	15:51:17	23.650	16.487	23.650	15.57	0.91
8/27/96	15:52:42	25.055	16.406	25.055	15.49	0.91
8/27/96	15:54:11	26.543	16.323	26.543	15.40	0.90
8/27/96	15:55:46	28.118	16.229	28.118	15.31	0.90
8/27/96	15:57:26	29.786	16.139	29.786	15.22	0.89
8/27/96	15:59:12	31.555	16.040	31.555	15.12	0.89
8/27/96	16:01:04	33.428	15.936	33.428	15.02	0.88
8/27/96	16:03:03	35.411	15.827	35.411	14.91	0.87
8/27/96	16:05:09	37.513	15.714	37.513	14.79	0.87
8/27/96	16:07:23	39.740	15.594	39.740	14.67	0.86
8/27/96	16:09:44	42.098	15.470	42.098	14.55	0.85
8/27/96	16:12:14	44.596	15.338	44.596	14.42	0.85
8/27/96	16:14:53	47.243	15.200	47.243	14.28	0.84
8/27/96	16:17:41	50.046	15.055	50.046	14.14	0.83
8/27/96	16:20:39	53.015	14.902	53.015	13.98	0.82
8/27/96	16:23:48	56.160	14.741	56.160	13.82	0.81
8/27/96	16:27:08	59.491	14.575	59.491	13.66	0.80
8/27/96	16:30:40	63.020	14.402	63.020	13.48	0.79
8/27/96	16:34:24	66.758	14.222	66.758	13.30	0.78
8/27/96	16:38:22	70.718	14.028	70.718	13.11	0.77
8/27/96	16:42:33	74.911	13.830	74.911	12.91	0.76
8/27/96	16:47:00	79.355	13.622	79.355	12.70	0.75
8/27/96	16:51:42	84.061	13.410	84.061	12.49	0.73
8/27/96	16:56:41	89.046	13.186	89.046	12.27	0.72
8/27/96	17:01:58	94.326	12.951	94.326	12.03	0.71
8/27/96	17:07:34	99.920	12.707	99.920	11.79	0.69
8/27/96	17:13:29	105.845	12.457	105.845	11.54	0.68
8/27/96	17:19:46	112.120	12.199	112.120	11.28	0.66
8/27/96	17:26:25	118.768	11.929	118.768	11.01	0.65
8/27/96	17:33:27	125.810	11.650	125.810	10.73	0.63
8/27/96	17:40:55	133.268	11.362	133.268	10.44	0.61
8/27/96	17:48:49	141.168	11.066	141.168	10.15	0.60
8/27/96	17:57:11	149.536	10.762	149.536	9.84	0.58
8/27/96	18:06:03	158.401	10.451	158.401	9.53	0.56
8/27/96	18:15:26	167.791	10.128	167.791	9.21	0.54
8/27/96	18:25:23	177.738	9.756	177.738	8.84	0.52
8/27/96	18:35:55	188.275	9.422	188.275	8.50	0.50
8/27/96	18:47:05	199.435	9.085	199.435	8.17	0.48

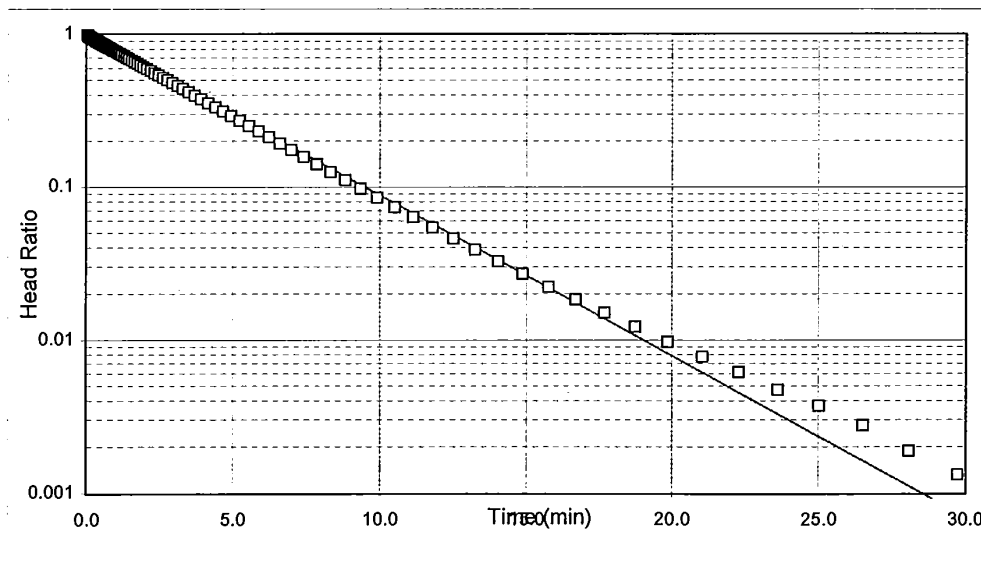
DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/27/96	18:58:54	211.256	8.741	211.256	7.82	0.46
8/27/96	19:11:25	223.778	8.395	223.778	7.48	0.44
8/27/96	19:24:41	237.043	8.045	237.043	7.13	0.42
8/27/96	19:38:44	251.093	7.690	251.093	6.77	0.40
8/27/96	19:53:37	265.976	7.337	265.976	6.42	0.38
8/27/96	20:09:23	281.741	6.981	281.741	6.06	0.36
8/27/96	20:26:05	298.440	6.626	298.440	5.71	0.33
8/27/96	20:43:46	316.128	6.276	316.128	5.36	0.31
8/27/96	21:02:30	334.865	5.927	334.865	5.01	0.29
8/27/96	21:22:21	354.711	5.586	354.711	4.67	0.27
8/27/96	21:42:21	374.711	5.268	374.711	4.35	0.26
8/27/96	22:02:21	394.711	4.972	394.711	4.05	0.24
8/27/96	22:22:21	414.711	4.700	414.711	3.78	0.22
8/27/96	22:42:21	434.711	4.446	434.711	3.53	0.21
8/27/96	23:02:21	454.711	4.211	454.711	3.29	0.19
8/27/96	23:22:21	474.711	3.997	474.711	3.08	0.18
8/27/96	23:42:21	494.711	3.800	494.711	2.88	0.17
8/28/96	0:02:21	514.711	3.616	514.711	2.70	0.16
8/28/96	0:22:21	534.711	3.448	534.711	2.53	0.15
8/28/96	0:42:21	554.711	3.293	554.711	2.37	0.14
8/28/96	1:02:21	574.711	3.145	574.711	2.23	0.13
8/28/96	1:22:21	594.711	3.016	594.711	2.10	0.12
8/28/96	1:42:21	614.711	2.894	614.711	1.97	0.12
8/28/96	2:02:21	634.711	2.781	634.711	1.86	0.11
8/28/96	2:22:21	654.711	2.679	654.711	1.76	0.10
8/28/96	2:42:21	674.711	2.585	674.711	1.67	0.10
8/28/96	3:02:21	694.711	2.502	694.711	1.58	0.09
8/28/96	3:22:21	714.711	2.426	714.711	1.51	0.09
8/28/96	3:42:21	734.711	2.356	734.711	1.44	0.08
8/28/96	4:02:21	754.711	2.292	754.711	1.37	0.08
8/28/96	4:22:21	774.711	2.234	774.711	1.31	0.08
8/28/96	4:42:21	794.711	2.181	794.711	1.26	0.07
8/28/96	5:02:21	814.711	2.133	814.711	1.21	0.07
8/28/96	5:22:21	834.711	2.089	834.711	1.17	0.07
8/28/96	5:42:21	854.711	2.050	854.711	1.13	0.07
8/28/96	6:02:21	874.711	2.013	874.711	1.09	0.06
8/28/96	6:22:21	894.711	1.978	894.711	1.06	0.06
8/28/96	6:42:21	914.711	1.941	914.711	1.02	0.06
8/28/96	7:02:21	934.711	1.911	934.711	0.99	0.06
8/28/96	7:22:21	954.711	1.881	954.711	0.96	0.06
8/28/96	7:42:21	974.711	1.856	974.711	0.94	0.05
8/28/96	8:02:21	994.711	1.828	994.711	0.91	0.05
8/28/96	8:22:21	1014.711	1.803	1014.711	0.88	0.05
8/28/96	8:42:21	1034.711	1.778	1034.711	0.86	0.05
8/28/96	9:02:21	1054.711	1.754	1054.711	0.83	0.05
8/28/96	9:22:21	1074.711	1.734	1074.711	0.81	0.05
8/28/96	9:42:21	1094.711	1.713	1094.711	0.79	0.05
8/28/96	10:02:21	1114.711	1.697	1114.711	0.78	0.05
8/28/96	10:22:21	1134.711	1.678	1134.711	0.76	0.04
8/28/96	10:42:21	1154.711	1.662	1154.711	0.74	0.04
8/28/96	11:02:21	1174.711	1.646	1174.711	0.73	0.04
8/28/96	11:22:21	1194.711	1.630	1194.711	0.71	0.04
8/28/96	11:42:21	1214.711	1.611	1214.711	0.69	0.04
8/28/96	12:02:21	1234.711	1.600	1234.711	0.68	0.04

**HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST MW-14R**

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet)
 R_e = equivalent radius (feet)
 L_e = length of screened interval (feet)
 t = time (minutes)
 h_t = head at time t (feet)

INPUT PARAMETERS	RESULTS
$r_c = 0.15$	
$R_e = 0.15$	
$L_e = 10$	
$t_1 = 0$	
$t_2 = 30$	
$h_1/h_0 = 1.00$	
$h_2/h_0 = 0.00$	
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> $K = 5.53E-04 \text{ cm/sec}$ $K = 1.57E+00 \text{ ft/day}$ </div>



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 08/27/96

Analysis By: SDM
 Checked By: FG
 Analysis Date: 1/17/97

RISING HEAD TEST MW-14R

WELL NO. MW-14R

DATE 8/27/96
 INITIAL DEPTH TO WATER 2.175 FEET (btoc)
 CASING DIAMETER 3.5 INCHES
 SAND DIAMETER 3.5 INCHES
 TOP OF OPEN INTERVAL 64 FEET (btoc)
 BOTTOM OF OPEN INTERVAL 74 FEET (btoc)
 SATURATED THICKNESS 10 FEET
 WATER TABLE TO BOTTOM OF SCREEN 71.825 FEET
 EQUIVALENT DIAMETER 3.50 INCHES
 OPEN INTERVAL LENGTH 10 FEET
 STATIC IN SCREEN? N
 MAX. HEAD CHANGE 31.67 FEET
 MAX. HEAD IN SCREEN? N

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/27/96	13:59:35	0.000	33.848		31.67	
8/27/96	13:59:35	0.005	33.862		31.69	
8/27/96	13:59:35	0.010	33.929		31.75	
8/27/96	13:59:35	0.015	33.844		31.67	
8/27/96	13:59:36	0.020	33.922		31.75	
8/27/96	13:59:36	0.025	33.772		31.60	
8/27/96	13:59:36	0.030	33.791		31.62	
8/27/96	13:59:37	0.035	33.885	0.000	31.71	1.000
8/27/96	13:59:37	0.040	33.823	0.005	31.65	0.998
8/27/96	13:59:37	0.045	33.823	0.010	31.65	0.998
8/27/96	13:59:38	0.050	33.848	0.015	31.67	0.999
8/27/96	13:59:38	0.055	33.710	0.020	31.54	0.994
8/27/96	13:59:38	0.060	33.701	0.025	31.53	0.994
8/27/96	13:59:38	0.065	33.654	0.030	31.48	0.993
8/27/96	13:59:39	0.070	33.541	0.035	31.37	0.989
8/27/96	13:59:39	0.075	33.403	0.040	31.23	0.985
8/27/96	13:59:39	0.080	33.235	0.045	31.06	0.980
8/27/96	13:59:40	0.085	33.225	0.050	31.05	0.979
8/27/96	13:59:40	0.090	33.135	0.055	30.96	0.976
8/27/96	13:59:40	0.095	33.027	0.060	30.85	0.973
8/27/96	13:59:41	0.100	32.995	0.065	30.82	0.972
8/27/96	13:59:41	0.106	32.937	0.071	30.76	0.970
8/27/96	13:59:41	0.112	32.870	0.077	30.70	0.968
8/27/96	13:59:42	0.119	32.815	0.084	30.64	0.966
8/27/96	13:59:42	0.126	32.757	0.091	30.58	0.964
8/27/96	13:59:42	0.133	32.683	0.098	30.51	0.962
8/27/96	13:59:43	0.141	32.621	0.106	30.45	0.960
8/27/96	13:59:43	0.149	32.508	0.114	30.33	0.957
8/27/96	13:59:44	0.158	32.448	0.123	30.27	0.955
8/27/96	13:59:45	0.167	32.377	0.132	30.20	0.952
8/27/96	13:59:45	0.177	32.300	0.142	30.13	0.950
8/27/96	13:59:46	0.188	32.227	0.153	30.05	0.948
8/27/96	13:59:46	0.199	32.151	0.164	29.98	0.945
8/27/96	13:59:47	0.210	32.061	0.175	29.89	0.942
8/27/96	13:59:48	0.223	31.966	0.188	29.79	0.939
8/27/96	13:59:49	0.236	31.876	0.201	29.70	0.937
8/27/96	13:59:49	0.250	31.777	0.215	29.60	0.934
8/27/96	13:59:50	0.265	31.664	0.230	29.49	0.930
8/27/96	13:59:51	0.280	31.542	0.245	29.37	0.926

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/27/96	13:59:52	0.297	31.433	0.262	29.26	0.923
8/27/96	13:59:53	0.315	31.302	0.280	29.13	0.919
8/27/96	13:59:55	0.333	31.170	0.298	29.00	0.914
8/27/96	13:59:56	0.353	31.030	0.318	28.86	0.910
8/27/96	13:59:57	0.374	30.877	0.339	28.70	0.905
8/27/96	13:59:58	0.396	30.718	0.361	28.54	0.900
8/27/96	14:00:00	0.420	30.559	0.385	28.38	0.895
8/27/96	14:00:01	0.445	30.384	0.410	28.21	0.890
8/27/96	14:00:03	0.470	30.208	0.435	28.03	0.884
8/27/96	14:00:04	0.496	30.021	0.461	27.85	0.878
8/27/96	14:00:06	0.525	29.828	0.490	27.65	0.872
8/27/96	14:00:08	0.555	29.639	0.520	27.46	0.866
8/27/96	14:00:10	0.586	29.424	0.551	27.25	0.859
8/27/96	14:00:12	0.621	29.186	0.586	27.01	0.852
8/27/96	14:00:14	0.658	28.947	0.623	26.77	0.844
8/27/96	14:00:16	0.696	28.697	0.661	26.52	0.836
8/27/96	14:00:19	0.738	28.425	0.703	26.25	0.828
8/27/96	14:00:21	0.781	28.146	0.746	25.97	0.819
8/27/96	14:00:24	0.828	27.851	0.793	25.68	0.810
8/27/96	14:00:27	0.876	27.549	0.841	25.37	0.800
8/27/96	14:00:30	0.928	27.228	0.893	25.05	0.790
8/27/96	14:00:33	0.983	26.896	0.948	24.72	0.780
8/27/96	14:00:37	1.041	26.548	1.006	24.37	0.769
8/27/96	14:00:41	1.103	26.176	1.068	24.00	0.757
8/27/96	14:00:45	1.168	25.798	1.133	23.62	0.745
8/27/96	14:00:49	1.238	25.394	1.203	23.22	0.732
8/27/96	14:00:53	1.311	24.981	1.276	22.81	0.719
8/27/96	14:00:58	1.390	24.548	1.355	22.37	0.706
8/27/96	14:01:03	1.473	24.096	1.438	21.92	0.691
8/27/96	14:01:08	1.561	23.630	1.526	21.46	0.677
8/27/96	14:01:14	1.655	23.145	1.620	20.97	0.661
8/27/96	14:01:20	1.753	22.638	1.718	20.46	0.645
8/27/96	14:01:26	1.858	22.121	1.823	19.95	0.629
8/27/96	14:01:33	1.968	21.586	1.933	19.41	0.612
8/27/96	14:01:40	2.085	21.042	2.050	18.87	0.595
8/27/96	14:01:47	2.210	20.476	2.175	18.30	0.577
8/27/96	14:01:55	2.341	19.886	2.306	17.71	0.559
8/27/96	14:02:03	2.481	19.307	2.446	17.13	0.540
8/27/96	14:02:12	2.630	18.700	2.595	16.53	0.521
8/27/96	14:02:22	2.786	18.078	2.751	15.90	0.502
8/27/96	14:02:32	2.953	17.443	2.918	15.27	0.481
8/27/96	14:02:42	3.130	16.800	3.095	14.63	0.461
8/27/96	14:02:53	3.316	16.142	3.281	13.97	0.440
8/27/96	14:03:05	3.515	15.480	3.480	13.31	0.420
8/27/96	14:03:18	3.725	14.811	3.690	12.64	0.398
8/27/96	14:03:31	3.946	14.140	3.911	11.97	0.377
8/27/96	14:03:45	4.181	13.469	4.146	11.29	0.356
8/27/96	14:04:00	4.430	12.793	4.395	10.62	0.335
8/27/96	14:04:16	4.693	12.126	4.658	9.95	0.314
8/27/96	14:04:33	4.973	11.467	4.938	9.29	0.293
8/27/96	14:04:51	5.270	10.809	5.235	8.63	0.272
8/27/96	14:05:09	5.583	10.163	5.548	7.99	0.252
8/27/96	14:05:29	5.915	9.541	5.880	7.37	0.232
8/27/96	14:05:50	6.266	8.918	6.231	6.74	0.213
8/27/96	14:06:13	6.640	8.313	6.605	6.14	0.194
8/27/96	14:06:37	7.035	7.732	7.000	5.56	0.175

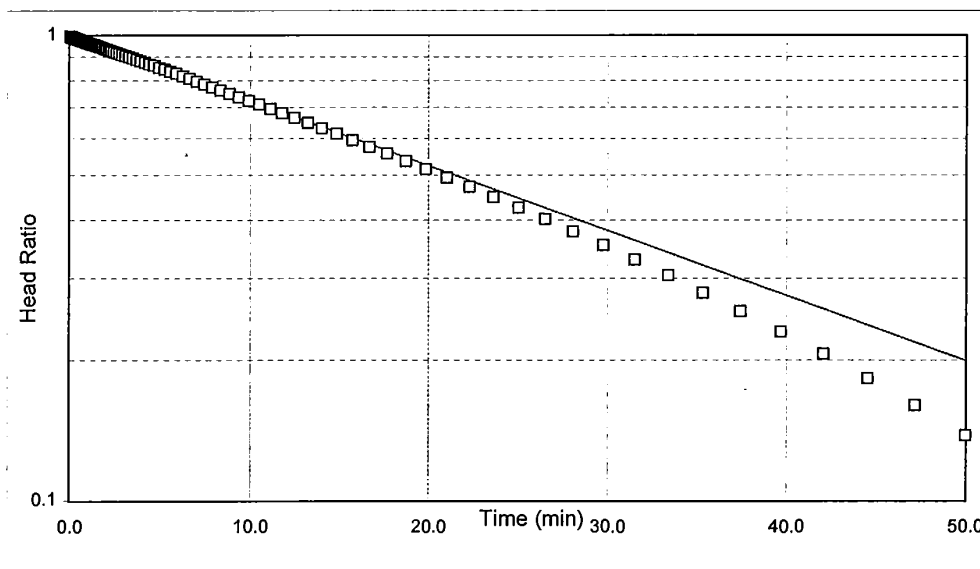
DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/27/96	14:07:02	7.453	7.179	7.418	5.00	0.158
8/27/96	14:07:28	7.896	6.660	7.861	4.49	0.141
8/27/96	14:07:56	8.366	6.164	8.331	3.99	0.126
8/27/96	14:08:26	8.865	5.705	8.830	3.53	0.111
8/27/96	14:08:58	9.391	5.278	9.356	3.10	0.098
8/27/96	14:09:31	9.950	4.883	9.915	2.71	0.085
8/27/96	14:10:07	10.541	4.524	10.506	2.35	0.074
8/27/96	14:10:45	11.168	4.196	11.133	2.02	0.064
8/27/96	14:11:24	11.831	3.905	11.796	1.73	0.055
8/27/96	14:12:07	12.535	3.645	12.500	1.47	0.046
8/27/96	14:12:51	13.280	3.414	13.245	1.24	0.039
8/27/96	14:13:39	14.070	3.213	14.035	1.04	0.033
8/27/96	14:14:29	14.906	3.036	14.871	0.86	0.027
8/27/96	14:15:22	15.791	2.881	15.756	0.71	0.022
8/27/96	14:16:18	16.730	2.759	16.695	0.58	0.018
8/27/96	14:17:18	17.723	2.653	17.688	0.48	0.015
8/27/96	14:18:21	18.776	2.563	18.741	0.39	0.012
8/27/96	14:19:28	19.891	2.484	19.856	0.31	0.010
8/27/96	14:20:39	21.073	2.422	21.038	0.25	0.008
8/27/96	14:21:54	22.325	2.371	22.290	0.20	0.006
8/27/96	14:23:13	23.650	2.325	23.615	0.15	0.005
8/27/96	14:24:38	25.055	2.293	25.020	0.12	0.004
8/27/96	14:26:07	26.543	2.263	26.508	0.09	0.003
8/27/96	14:27:42	28.118	2.235	28.083	0.06	0.002
8/27/96	14:29:22	29.786	2.217	29.751	0.04	0.001
8/27/96	14:31:08	31.555	2.198	31.520	0.02	0.001
8/27/96	14:33:00	33.428	2.185	33.393	0.01	0.000
8/27/96	14:34:59	35.411	2.175	35.376	0.00	0.000

HVORSLEV SLUG TEST ANALYSIS RISING HEAD TEST MW-15D

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet)
 R_e = equivalent radius (feet)
 L_e = length of screened interval (feet)
 t = time (minutes)
 h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS
$r_c =$	0.17	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> $K = 1.53\text{E-}04 \text{ cm/sec}$ $K = 4.33\text{E-}01 \text{ ft/day}$ </div>
$R_e =$	0.33	
$L_e =$	3.5	
$t_1 =$	0	
$t_2 =$	50	
$h_1/h_0 =$	1.00	
$h_2/h_0 =$	0.20	



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 08/28/96

Analysis By: SDM
 Checked By: FG
 Analysis Date: 1/17/97

RISING HEAD TEST MW-15D

MW-15D

DATE	8/28/96	
INITIAL DEPTH TO WATER	9.4	FEET (btoc)
CASING DIAMETER	4	INCHES
SAND DIAMETER	8	INCHES
TOP OF OPEN INTERVAL	48.5	FEET (btoc)
BOTTOM OF OPEN INTERVAL	52	FEET (btoc)
SATURATED THICKNESS	4	FEET
WATER TABLE TO BOTTOM OF SCREEN	42.6	FEET
EQUIVALENT DIAMETER	5.51	INCHES
OPEN INTERVAL LENGTH	3.5	FEET
STATIC IN SCREEN?	N	
MAX. HEAD CHANGE	11.88	FEET
MAX. HEAD IN SCREEN?	N	

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	15:39:11	0.000	21.281		11.88	
8/28/96	15:39:11	0.005	21.657		12.26	
8/28/96	15:39:11	0.010	21.650		12.25	
8/28/96	15:39:11	0.015	21.871		12.47	
8/28/96	15:39:12	0.020	21.659		12.26	
8/28/96	15:39:12	0.025	21.694		12.29	
8/28/96	15:39:12	0.030	21.519		12.12	
8/28/96	15:39:13	0.035	21.881	0.000	12.48	1.00
8/28/96	15:39:13	0.040	21.848	0.005	12.45	1.00
8/28/96	15:39:13	0.045	21.848	0.010	12.45	1.00
8/28/96	15:39:14	0.050	21.844	0.015	12.44	1.00
8/28/96	15:39:14	0.055	21.825	0.020	12.43	1.00
8/28/96	15:39:14	0.060	21.848	0.025	12.45	1.00
8/28/96	15:39:14	0.065	21.858	0.030	12.46	1.00
8/28/96	15:39:15	0.070	21.871	0.035	12.47	1.00
8/28/96	15:39:15	0.075	21.807	0.040	12.41	0.99
8/28/96	15:39:15	0.080	21.807	0.045	12.41	0.99
8/28/96	15:39:16	0.085	21.844	0.050	12.44	1.00
8/28/96	15:39:16	0.090	21.825	0.055	12.43	1.00
8/28/96	15:39:16	0.095	21.825	0.060	12.43	1.00
8/28/96	15:39:17	0.100	21.830	0.065	12.43	1.00
8/28/96	15:39:17	0.106	21.809	0.071	12.41	0.99
8/28/96	15:39:17	0.112	21.821	0.077	12.42	1.00
8/28/96	15:39:18	0.119	21.805	0.084	12.41	0.99
8/28/96	15:39:18	0.126	21.816	0.091	12.42	0.99
8/28/96	15:39:18	0.133	21.800	0.098	12.40	0.99
8/28/96	15:39:19	0.141	21.800	0.106	12.40	0.99
8/28/96	15:39:19	0.149	21.781	0.114	12.38	0.99
8/28/96	15:39:20	0.158	21.781	0.123	12.38	0.99
8/28/96	15:39:21	0.167	21.795	0.132	12.40	0.99
8/28/96	15:39:21	0.177	21.781	0.142	12.38	0.99
8/28/96	15:39:22	0.188	21.791	0.153	12.39	0.99
8/28/96	15:39:22	0.199	21.777	0.164	12.38	0.99
8/28/96	15:39:23	0.210	21.781	0.175	12.38	0.99
8/28/96	15:39:24	0.223	21.763	0.188	12.36	0.99
8/28/96	15:39:25	0.236	21.758	0.201	12.36	0.99
8/28/96	15:39:25	0.250	21.754	0.215	12.35	0.99
8/28/96	15:39:26	0.265	21.745	0.230	12.35	0.99

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	15:39:27	0.280	21.735	0.245	12.34	0.99
8/28/96	15:39:28	0.297	21.731	0.262	12.33	0.99
8/28/96	15:39:29	0.315	21.721	0.280	12.32	0.99
8/28/96	15:39:31	0.333	21.712	0.298	12.31	0.99
8/28/96	15:39:32	0.353	21.708	0.318	12.31	0.99
8/28/96	15:39:33	0.374	21.698	0.339	12.30	0.99
8/28/96	15:39:34	0.396	21.692	0.361	12.29	0.98
8/28/96	15:39:36	0.420	21.682	0.385	12.28	0.98
8/28/96	15:39:37	0.445	21.673	0.410	12.27	0.98
8/28/96	15:39:39	0.470	21.664	0.435	12.26	0.98
8/28/96	15:39:40	0.496	21.650	0.461	12.25	0.98
8/28/96	15:39:42	0.525	21.641	0.490	12.24	0.98
8/28/96	15:39:44	0.555	21.627	0.520	12.23	0.98
8/28/96	15:39:46	0.586	21.618	0.551	12.22	0.98
8/28/96	15:39:48	0.621	21.604	0.586	12.20	0.98
8/28/96	15:39:50	0.658	21.585	0.623	12.19	0.98
8/28/96	15:39:52	0.696	21.572	0.661	12.17	0.98
8/28/96	15:39:55	0.738	21.558	0.703	12.16	0.97
8/28/96	15:39:57	0.781	21.542	0.746	12.14	0.97
8/28/96	15:40:00	0.828	21.523	0.793	12.12	0.97
8/28/96	15:40:03	0.876	21.505	0.841	12.11	0.97
8/28/96	15:40:06	0.928	21.486	0.893	12.09	0.97
8/28/96	15:40:09	0.983	21.463	0.948	12.06	0.97
8/28/96	15:40:13	1.041	21.440	1.006	12.04	0.96
8/28/96	15:40:17	1.103	21.417	1.068	12.02	0.96
8/28/96	15:40:21	1.168	21.392	1.133	11.99	0.96
8/28/96	15:40:25	1.238	21.369	1.203	11.97	0.96
8/28/96	15:40:29	1.311	21.341	1.276	11.94	0.96
8/28/96	15:40:34	1.390	21.313	1.355	11.91	0.95
8/28/96	15:40:39	1.473	21.281	1.438	11.88	0.95
8/28/96	15:40:44	1.561	21.246	1.526	11.85	0.95
8/28/96	15:40:50	1.655	21.214	1.620	11.81	0.95
8/28/96	15:40:56	1.753	21.177	1.718	11.78	0.94
8/28/96	15:41:02	1.858	21.140	1.823	11.74	0.94
8/28/96	15:41:09	1.968	21.101	1.933	11.70	0.94
8/28/96	15:41:16	2.085	21.059	2.050	11.66	0.93
8/28/96	15:41:23	2.210	21.013	2.175	11.61	0.93
8/28/96	15:41:31	2.341	20.965	2.306	11.57	0.93
8/28/96	15:41:39	2.481	20.919	2.446	11.52	0.92
8/28/96	15:41:48	2.630	20.868	2.595	11.47	0.92
8/28/96	15:41:58	2.786	20.815	2.751	11.42	0.91
8/28/96	15:42:08	2.953	20.755	2.918	11.36	0.91
8/28/96	15:42:18	3.130	20.693	3.095	11.29	0.90
8/28/96	15:42:29	3.316	20.628	3.281	11.23	0.90
8/28/96	15:42:41	3.515	20.566	3.480	11.17	0.89
8/28/96	15:42:54	3.725	20.487	3.690	11.09	0.89
8/28/96	15:43:07	3.946	20.407	3.911	11.01	0.88
8/28/96	15:43:21	4.181	20.333	4.146	10.93	0.88
8/28/96	15:43:36	4.430	20.238	4.395	10.84	0.87
8/28/96	15:43:52	4.693	20.174	4.658	10.77	0.86
8/28/96	15:44:09	4.973	20.056	4.938	10.66	0.85
8/28/96	15:44:27	5.270	19.957	5.235	10.56	0.85
8/28/96	15:44:45	5.583	19.858	5.548	10.46	0.84
8/28/96	15:45:05	5.915	19.740	5.880	10.34	0.83
8/28/96	15:45:26	6.266	19.611	6.231	10.21	0.82
8/28/96	15:45:49	6.640	19.475	6.605	10.08	0.81

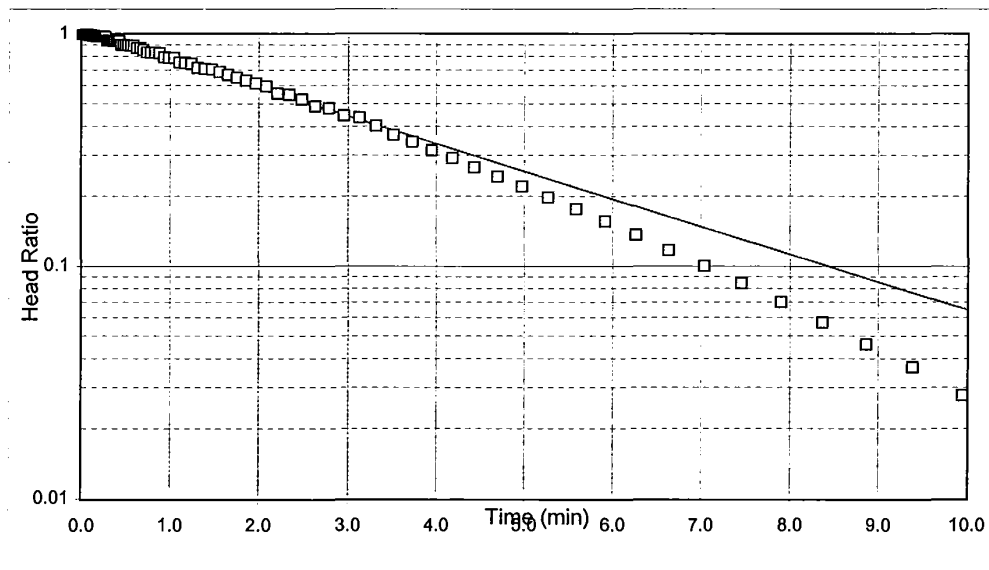
DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	15:46:13	7.035	19.334	7.000	9.93	0.80
8/28/96	15:46:38	7.453	19.203	7.418	9.80	0.79
8/28/96	15:47:04	7.896	19.067	7.861	9.67	0.77
8/28/96	15:47:32	8.366	18.921	8.331	9.52	0.76
8/28/96	15:48:02	8.865	18.771	8.830	9.37	0.75
8/28/96	15:48:34	9.391	18.610	9.356	9.21	0.74
8/28/96	15:49:07	9.950	18.451	9.915	9.05	0.73
8/28/96	15:49:43	10.541	18.278	10.506	8.88	0.71
8/28/96	15:50:21	11.168	18.093	11.133	8.69	0.70
8/28/96	15:51:00	11.831	17.906	11.796	8.51	0.68
8/28/96	15:51:43	12.535	17.710	12.500	8.31	0.67
8/28/96	15:52:27	13.280	17.512	13.245	8.11	0.65
8/28/96	15:53:15	14.070	17.288	14.035	7.89	0.63
8/28/96	15:54:05	14.906	17.071	14.871	7.67	0.61
8/28/96	15:54:58	15.791	16.838	15.756	7.44	0.60
8/28/96	15:55:54	16.730	16.598	16.695	7.20	0.58
8/28/96	15:56:54	17.723	16.358	17.688	6.96	0.56
8/28/96	15:57:57	18.776	16.102	18.741	6.70	0.54
8/28/96	15:59:04	19.891	15.839	19.856	6.44	0.52
8/28/96	16:00:15	21.073	15.577	21.038	6.18	0.49
8/28/96	16:01:30	22.325	15.300	22.290	5.90	0.47
8/28/96	16:02:49	23.650	15.014	23.615	5.61	0.45
8/28/96	16:04:14	25.055	14.723	25.020	5.32	0.43
8/28/96	16:05:43	26.543	14.428	26.508	5.03	0.40
8/28/96	16:07:18	28.118	14.128	28.083	4.73	0.38
8/28/96	16:08:58	29.786	13.823	29.751	4.42	0.35
8/28/96	16:10:44	31.555	13.512	31.520	4.11	0.33
8/28/96	16:12:36	33.428	13.208	33.393	3.81	0.31
8/28/96	16:14:35	35.411	12.885	35.376	3.49	0.28
8/28/96	16:16:41	37.513	12.585	37.478	3.19	0.26
8/28/96	16:18:55	39.740	12.276	39.705	2.88	0.23
8/28/96	16:21:16	42.098	11.980	42.063	2.58	0.21
8/28/96	16:23:46	44.596	11.685	44.561	2.29	0.18
8/28/96	16:26:25	47.243	11.399	47.208	2.00	0.16
8/28/96	16:29:13	50.046	11.122	50.011	1.72	0.14
8/28/96	16:32:11	53.015	10.864	52.980	1.46	0.12
8/28/96	16:35:20	56.160	10.613	56.125	1.21	0.10
8/28/96	16:38:40	59.491	10.387	59.456	0.99	0.08
8/28/96	16:42:12	63.020	10.181	62.985	0.78	0.06
8/28/96	16:45:56	66.758	9.990	66.723	0.59	0.05
8/28/96	16:49:54	70.718	9.828	70.683	0.43	0.03
8/28/96	16:54:05	74.911	9.678	74.876	0.28	0.02
8/28/96	16:58:32	79.355	9.554	79.320	0.15	0.01

**HVORSLEV SLUG TEST ANALYSIS
RISING HEAD TEST MW-16D**

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet)
 R_e = equivalent radius (feet)
 L_e = length of screened interval (feet)
 t = time (minutes)
 h_t = head at time t (feet)

INPUT PARAMETERS	RESULTS
$r_c = 0.17$	
$R_e = 0.33$	
$L_e = 9$	
$t_1 = 0$	$K = 7.09E-04 \text{ cm/sec}$
$t_2 = 10$	$K = 2.01E+00 \text{ ft/day}$
$h_1/h_0 = 1.01$	
$h_2/h_0 = 0.07$	



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 08/28/96

Analysis By: SDM
 Checked By: FG
 Analysis Date: 1/17/97

RISING HEAD TEST MW-16D

WELL NO. MW-16D

DATE 8/28/96
 INITIAL DEPTH TO WATER 6.3 FEET (btoc)
 CASING DIAMETER 4 INCHES
 SAND DIAMETER 8 INCHES
 TOP OF OPEN INTERVAL 27 FEET (btoc)
 BOTTOM OF OPEN INTERVAL 36 FEET (btoc)
 SATURATED THICKNESS 9 FEET
 WATER TABLE TO BOTTOM OF SCREEN 29.7 FEET
 EQUIVALENT DIAMETER 5.51 INCHES
 OPEN INTERVAL LENGTH 9 FEET
 STATIC IN SCREEN? N
 MAX. HEAD CHANGE 11.25 FEET
 MAX. HEAD IN SCREEN? N

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	9:43:35	0.0000	17.5510	0.000	11.25	1.00
8/28/96	9:43:35	0.0050	17.5510	0.005	11.25	1.00
8/28/96	9:43:35	0.0100	17.5470	0.010	11.25	1.00
8/28/96	9:43:35	0.0150	17.5470	0.015	11.25	1.00
8/28/96	9:43:36	0.0200	17.5420	0.020	11.24	1.00
8/28/96	9:43:36	0.0250	17.5470	0.025	11.25	1.00
8/28/96	9:43:36	0.0300	17.5420	0.030	11.24	1.00
8/28/96	9:43:37	0.0350	17.5420	0.035	11.24	1.00
8/28/96	9:43:37	0.0400	17.5380	0.040	11.24	1.00
8/28/96	9:43:37	0.0450	17.5330	0.045	11.23	1.00
8/28/96	9:43:38	0.0500	17.5240	0.050	11.22	1.00
8/28/96	9:43:38	0.0550	17.5190	0.055	11.22	1.00
8/28/96	9:43:38	0.0600	17.5100	0.060	11.21	1.00
8/28/96	9:43:38	0.0650	17.5010	0.065	11.20	1.00
8/28/96	9:43:39	0.0700	17.4870	0.070	11.19	0.99
8/28/96	9:43:39	0.0750	17.4780	0.075	11.18	0.99
8/28/96	9:43:39	0.0800	17.4660	0.080	11.17	0.99
8/28/96	9:43:40	0.0850	17.4610	0.085	11.16	0.99
8/28/96	9:43:40	0.0900	17.4480	0.090	11.15	0.99
8/28/96	9:43:40	0.0950	17.4380	0.095	11.14	0.99
8/28/96	9:43:41	0.1000	17.4290	0.100	11.13	0.99
8/28/96	9:43:41	0.1058	17.4200	0.106	11.12	0.99
8/28/96	9:43:41	0.1120	17.4060	0.112	11.11	0.99
8/28/96	9:43:42	0.1185	17.3970	0.119	11.10	0.99
8/28/96	9:43:42	0.1255	17.3880	0.126	11.09	0.99
8/28/96	9:43:42	0.1328	17.3780	0.133	11.08	0.98
8/28/96	9:43:43	0.1407	17.3650	0.141	11.07	0.98
8/28/96	9:43:43	0.1490	17.3480	0.149	11.05	0.98
8/28/96	9:43:44	0.1578	17.3390	0.158	11.04	0.98
8/28/96	9:43:45	0.1672	17.3300	0.167	11.03	0.98
8/28/96	9:43:45	0.1770	17.3250	0.177	11.03	0.98
8/28/96	9:43:46	0.1875	17.3210	0.188	11.02	0.98
8/28/96	9:43:46	0.1985	17.3120	0.199	11.01	0.98
8/28/96	9:43:47	0.2102	17.3070	0.210	11.01	0.98
8/28/96	9:43:48	0.2227	17.2880	0.223	10.99	0.98
8/28/96	9:43:49	0.2358	17.2840	0.236	10.98	0.98
8/28/96	9:43:49	0.2498	17.2790	0.250	10.98	0.98
8/28/96	9:43:50	0.2647	17.2750	0.265	10.98	0.98

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	9:43:51	0.2803	16.9030	0.280	10.60	0.94
8/28/96	9:43:52	0.2970	16.8850	0.297	10.59	0.94
8/28/96	9:43:53	0.3147	16.8660	0.315	10.57	0.94
8/28/96	9:43:55	0.3333	16.8530	0.333	10.55	0.94
8/28/96	9:43:56	0.3532	16.8340	0.353	10.53	0.94
8/28/96	9:43:57	0.3742	16.8250	0.374	10.53	0.94
8/28/96	9:43:58	0.3963	16.8090	0.396	10.51	0.93
8/28/96	9:44:00	0.4198	16.7990	0.420	10.50	0.93
8/28/96	9:44:01	0.4447	16.4440	0.445	10.14	0.90
8/28/96	9:44:03	0.4697	16.4190	0.470	10.12	0.90
8/28/96	9:44:04	0.4963	16.3960	0.496	10.10	0.90
8/28/96	9:44:06	0.5247	16.3770	0.525	10.08	0.90
8/28/96	9:44:08	0.5547	16.3590	0.555	10.06	0.89
8/28/96	9:44:10	0.5863	16.3400	0.586	10.04	0.89
8/28/96	9:44:12	0.6213	16.1190	0.621	9.82	0.87
8/28/96	9:44:14	0.6580	16.1100	0.658	9.81	0.87
8/28/96	9:44:16	0.6963	15.9140	0.696	9.61	0.85
8/28/96	9:44:19	0.7380	15.7150	0.738	9.42	0.84
8/28/96	9:44:21	0.7813	15.6780	0.781	9.38	0.83
8/28/96	9:44:24	0.8280	15.6510	0.828	9.35	0.83
8/28/96	9:44:27	0.8763	15.6280	0.876	9.33	0.83
8/28/96	9:44:30	0.9280	15.2470	0.928	8.95	0.80
8/28/96	9:44:33	0.9830	15.2100	0.983	8.91	0.79
8/28/96	9:44:37	1.0413	15.1760	1.041	8.88	0.79
8/28/96	9:44:41	1.1030	14.8160	1.103	8.52	0.76
8/28/96	9:44:45	1.1680	14.7580	1.168	8.46	0.75
8/28/96	9:44:49	1.2380	14.7120	1.238	8.41	0.75
8/28/96	9:44:53	1.3113	14.3410	1.311	8.04	0.71
8/28/96	9:44:58	1.3897	14.2810	1.390	7.98	0.71
8/28/96	9:45:03	1.4730	14.2390	1.473	7.94	0.71
8/28/96	9:45:08	1.5613	14.0310	1.561	7.73	0.69
8/28/96	9:45:14	1.6547	13.8220	1.655	7.52	0.67
8/28/96	9:45:20	1.7530	13.6280	1.753	7.33	0.65
8/28/96	9:45:26	1.8580	13.4180	1.858	7.12	0.63
8/28/96	9:45:33	1.9680	13.2150	1.968	6.92	0.61
8/28/96	9:45:40	2.0847	13.0100	2.085	6.71	0.60
8/28/96	9:45:47	2.2097	12.5390	2.210	6.24	0.55
8/28/96	9:45:55	2.3413	12.4790	2.341	6.18	0.55
8/28/96	9:46:03	2.4813	12.2020	2.481	5.90	0.52
8/28/96	9:46:12	2.6297	11.8030	2.630	5.50	0.49
8/28/96	9:46:22	2.7863	11.7110	2.786	5.41	0.48
8/28/96	9:46:32	2.9530	11.3170	2.953	5.02	0.45
8/28/96	9:46:42	3.1297	11.2270	3.130	4.93	0.44
8/28/96	9:46:53	3.3163	10.8300	3.316	4.53	0.40
8/28/96	9:47:05	3.5147	10.4490	3.515	4.15	0.37
8/28/96	9:47:18	3.7247	10.1630	3.725	3.86	0.34
8/28/96	9:47:31	3.9463	9.8590	3.946	3.56	0.32
8/28/96	9:47:45	4.1813	9.5910	4.181	3.29	0.29
8/28/96	9:48:00	4.4297	9.3050	4.430	3.01	0.27
8/28/96	9:48:16	4.6930	9.0420	4.693	2.74	0.24
8/28/96	9:48:33	4.9730	8.7860	4.973	2.49	0.22
8/28/96	9:48:51	5.2697	8.5320	5.270	2.23	0.20
8/28/96	9:49:09	5.5830	8.2880	5.583	1.99	0.18
8/28/96	9:49:29	5.9147	8.0590	5.915	1.76	0.16
8/28/96	9:49:50	6.2663	7.8380	6.266	1.54	0.14
8/28/96	9:50:13	6.6397	7.6240	6.640	1.32	0.12

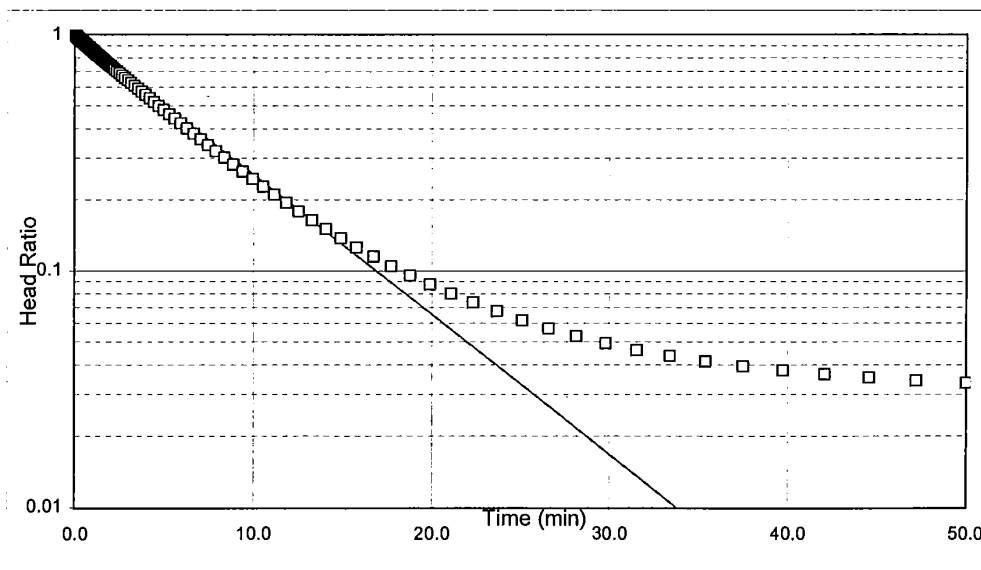
DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	9:50:37	7.0347	7.4270	7.035	1.13	0.10
8/28/96	9:51:02	7.4530	7.2520	7.453	0.95	0.08
8/28/96	9:51:28	7.8963	7.0880	7.896	0.79	0.07
8/28/96	9:51:56	8.3663	6.9450	8.366	0.65	0.06
8/28/96	9:52:26	8.8647	6.8190	8.865	0.52	0.05
8/28/96	9:52:58	9.3913	6.7150	9.391	0.42	0.04
8/28/96	9:53:31	9.9497	6.6130	9.950	0.31	0.03
8/28/96	9:54:07	10.5413	6.5370	10.541	0.24	0.02
8/28/96	9:54:45	11.1680	6.4820	11.168	0.18	0.02
8/28/96	9:55:24	11.8313	6.4360	11.831	0.14	0.01
8/28/96	9:56:07	12.5347	6.4060	12.535	0.11	0.01
8/28/96	9:56:51	13.2797	6.3780	13.280	0.08	0.01
8/28/96	9:57:39	14.0697	6.3640	14.070	0.06	0.01

HVORSLEV SLUG TEST ANALYSIS RISING HEAD TEST MW-17D

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet)
 R_e = equivalent radius (feet)
 L_e = length of screened interval (feet)
 t = time (minutes)
 h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS	
r_c	= 0.17	K =	2.71E-04 cm/sec
R_e	= 0.33	K =	7.68E-01 ft/day
L_e	= 13		
t_1	= 0		
t_2	= 33.8		
h_1/h_0	= 1.00		
h_2/h_0	= 0.01		



Project Name: 216 Paterson Plank Road Site, New Jersey
 Project No.: 943-6222
 Test Date: 08/28/96

Analysis By: SDM
 Checked By: FG
 Analysis Date: 1/17/97

RISING HEAD TEST MW-17D

WELL NO. MW-17D

DATE	8/28/96	
INITIAL DEPTH TO WATER	4.23	FEET (btoc)
CASING DIAMETER	4	INCHES
SAND DIAMETER	8	INCHES
TOP OF OPEN INTERVAL	42	FEET (btoc)
BOTTOM OF OPEN INTERVAL	55	FEET (btoc)
SATURATED THICKNESS	16	FEET
WATER TABLE TO BOTTOM OF SCREEN	50.77	FEET
EQUIVALENT DIAMETER	5.51	INCHES
OPEN INTERVAL LENGTH	13	FEET
STATIC IN SCREEN?	N	
MAX. HEAD CHANGE	12.57	FEET
MAX. HEAD IN SCREEN?	N	

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	12:54:13	0.000	16.802	0.000	12.57	1.00
8/28/96	12:54:13	0.005	16.796	0.005	12.57	1.00
8/28/96	12:54:13	0.010	16.786	0.010	12.56	1.00
8/28/96	12:54:13	0.015	16.775	0.015	12.55	1.00
8/28/96	12:54:14	0.020	16.761	0.020	12.53	1.00
8/28/96	12:54:14	0.025	16.752	0.025	12.52	1.00
8/28/96	12:54:14	0.030	16.742	0.030	12.51	1.00
8/28/96	12:54:15	0.035	16.731	0.035	12.50	0.99
8/28/96	12:54:15	0.040	16.719	0.040	12.49	0.99
8/28/96	12:54:15	0.045	16.712	0.045	12.48	0.99
8/28/96	12:54:16	0.050	16.701	0.050	12.47	0.99
8/28/96	12:54:16	0.055	16.689	0.055	12.46	0.99
8/28/96	12:54:16	0.060	16.680	0.060	12.45	0.99
8/28/96	12:54:16	0.065	16.669	0.065	12.44	0.99
8/28/96	12:54:17	0.070	16.659	0.070	12.43	0.99
8/28/96	12:54:17	0.075	16.648	0.075	12.42	0.99
8/28/96	12:54:17	0.080	16.639	0.080	12.41	0.99
8/28/96	12:54:18	0.085	16.629	0.085	12.40	0.99
8/28/96	12:54:18	0.090	16.620	0.090	12.39	0.99
8/28/96	12:54:18	0.095	16.611	0.095	12.38	0.98
8/28/96	12:54:19	0.100	16.602	0.100	12.37	0.98
8/28/96	12:54:19	0.106	16.588	0.106	12.36	0.98
8/28/96	12:54:19	0.112	16.576	0.112	12.35	0.98
8/28/96	12:54:20	0.119	16.565	0.119	12.34	0.98
8/28/96	12:54:20	0.126	16.551	0.126	12.32	0.98
8/28/96	12:54:20	0.133	16.537	0.133	12.31	0.98
8/28/96	12:54:21	0.141	16.521	0.141	12.29	0.98
8/28/96	12:54:21	0.149	16.493	0.149	12.26	0.98
8/28/96	12:54:22	0.158	16.477	0.158	12.25	0.97
8/28/96	12:54:23	0.167	16.459	0.167	12.23	0.97
8/28/96	12:54:23	0.177	16.440	0.177	12.21	0.97
8/28/96	12:54:24	0.188	16.420	0.188	12.19	0.97
8/28/96	12:54:24	0.199	16.399	0.199	12.17	0.97
8/28/96	12:54:25	0.210	16.378	0.210	12.15	0.97
8/28/96	12:54:26	0.223	16.355	0.223	12.13	0.96
8/28/96	12:54:27	0.236	16.330	0.236	12.10	0.96
8/28/96	12:54:27	0.250	16.304	0.250	12.07	0.96
8/28/96	12:54:28	0.265	16.277	0.265	12.05	0.96
8/28/96	12:54:29	0.280	16.249	0.280	12.02	0.96

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	12:54:30	0.297	16.219	0.297	11.99	0.95
8/28/96	12:54:31	0.315	16.187	0.315	11.96	0.95
8/28/96	12:54:33	0.333	16.152	0.333	11.92	0.95
8/28/96	12:54:34	0.353	16.115	0.353	11.89	0.95
8/28/96	12:54:35	0.374	16.078	0.374	11.85	0.94
8/28/96	12:54:36	0.396	16.039	0.396	11.81	0.94
8/28/96	12:54:38	0.420	15.997	0.420	11.77	0.94
8/28/96	12:54:39	0.445	15.954	0.445	11.72	0.93
8/28/96	12:54:41	0.470	15.910	0.470	11.68	0.93
8/28/96	12:54:42	0.496	15.864	0.496	11.63	0.93
8/28/96	12:54:44	0.525	15.815	0.525	11.59	0.92
8/28/96	12:54:46	0.555	15.762	0.555	11.53	0.92
8/28/96	12:54:48	0.586	15.709	0.586	11.48	0.91
8/28/96	12:54:50	0.621	15.649	0.621	11.42	0.91
8/28/96	12:54:52	0.658	15.587	0.658	11.36	0.90
8/28/96	12:54:54	0.696	15.522	0.696	11.29	0.90
8/28/96	12:54:57	0.738	15.451	0.738	11.22	0.89
8/28/96	12:54:59	0.781	15.382	0.781	11.15	0.89
8/28/96	12:55:02	0.828	15.303	0.828	11.07	0.88
8/28/96	12:55:05	0.876	15.222	0.876	10.99	0.87
8/28/96	12:55:08	0.928	15.142	0.928	10.91	0.87
8/28/96	12:55:11	0.983	15.049	0.983	10.82	0.86
8/28/96	12:55:15	1.041	14.943	1.041	10.71	0.85
8/28/96	12:55:19	1.103	14.833	1.103	10.60	0.84
8/28/96	12:55:23	1.168	14.717	1.168	10.49	0.83
8/28/96	12:55:27	1.238	14.604	1.238	10.37	0.83
8/28/96	12:55:31	1.311	14.493	1.311	10.26	0.82
8/28/96	12:55:36	1.390	14.380	1.390	10.15	0.81
8/28/96	12:55:41	1.473	14.256	1.473	10.03	0.80
8/28/96	12:55:46	1.561	14.127	1.561	9.90	0.79
8/28/96	12:55:52	1.655	13.991	1.655	9.76	0.78
8/28/96	12:55:58	1.753	13.852	1.753	9.62	0.77
8/28/96	12:56:04	1.858	13.705	1.858	9.48	0.75
8/28/96	12:56:11	1.968	13.552	1.968	9.32	0.74
8/28/96	12:56:18	2.085	13.398	2.085	9.17	0.73
8/28/96	12:56:25	2.210	13.232	2.210	9.00	0.72
8/28/96	12:56:33	2.341	13.063	2.341	8.83	0.70
8/28/96	12:56:41	2.481	12.886	2.481	8.66	0.69
8/28/96	12:56:50	2.630	12.701	2.630	8.47	0.67
8/28/96	12:57:00	2.786	12.512	2.786	8.28	0.66
8/28/96	12:57:10	2.953	12.316	2.953	8.09	0.64
8/28/96	12:57:20	3.130	12.113	3.130	7.88	0.63
8/28/96	12:57:31	3.316	11.905	3.316	7.68	0.61
8/28/96	12:57:43	3.515	11.689	3.515	7.46	0.59
8/28/96	12:57:56	3.725	11.469	3.725	7.24	0.58
8/28/96	12:58:09	3.946	11.246	3.946	7.02	0.56
8/28/96	12:58:23	4.181	11.013	4.181	6.78	0.54
8/28/96	12:58:38	4.430	10.777	4.430	6.55	0.52
8/28/96	12:58:54	4.693	10.535	4.693	6.31	0.50
8/28/96	12:59:11	4.973	10.291	4.973	6.06	0.48
8/28/96	12:59:29	5.270	10.044	5.270	5.81	0.46
8/28/96	12:59:47	5.583	9.792	5.583	5.56	0.44
8/28/96	13:00:07	5.915	9.543	5.915	5.31	0.42
8/28/96	13:00:28	6.266	9.290	6.266	5.06	0.40
8/28/96	13:00:51	6.640	9.036	6.640	4.81	0.38
8/28/96	13:01:15	7.035	8.780	7.035	4.55	0.36

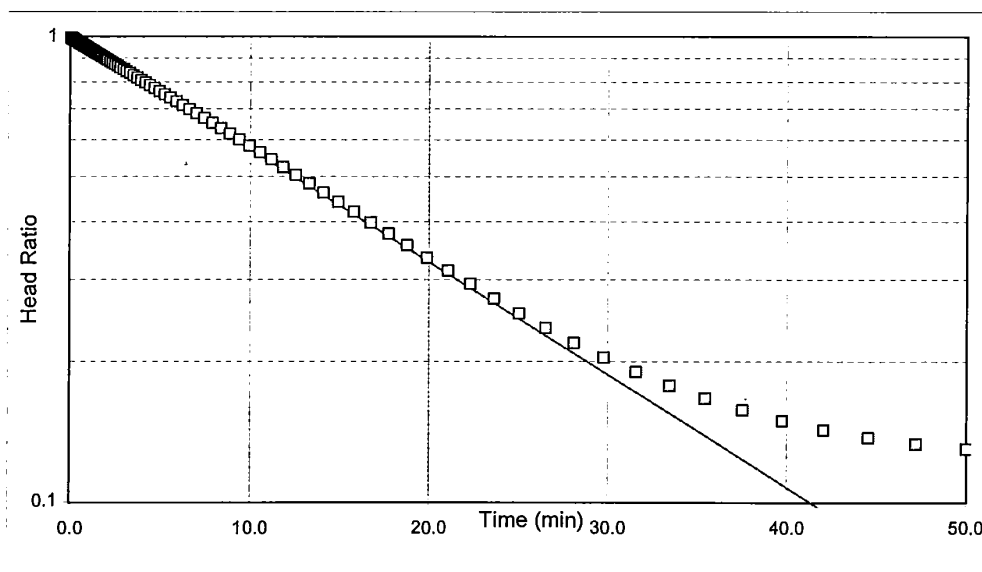
DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	13:01:40	7.453	8.528	7.453	4.30	0.34
8/28/96	13:02:06	7.896	8.279	7.896	4.05	0.32
8/28/96	13:02:34	8.366	8.032	8.366	3.80	0.30
8/28/96	13:03:04	8.865	7.788	8.865	3.56	0.28
8/28/96	13:03:36	9.391	7.553	9.391	3.32	0.26
8/28/96	13:04:09	9.950	7.322	9.950	3.09	0.25
8/28/96	13:04:45	10.541	7.098	10.541	2.87	0.23
8/28/96	13:05:23	11.168	6.886	11.168	2.66	0.21
8/28/96	13:06:02	11.831	6.678	11.831	2.45	0.19
8/28/96	13:06:45	12.535	6.482	12.535	2.25	0.18
8/28/96	13:07:29	13.280	6.298	13.280	2.07	0.16
8/28/96	13:08:17	14.070	6.125	14.070	1.90	0.15
8/28/96	13:09:07	14.906	5.963	14.906	1.73	0.14
8/28/96	13:10:00	15.791	5.813	15.791	1.58	0.13
8/28/96	13:10:56	16.730	5.677	16.730	1.45	0.12
8/28/96	13:11:56	17.723	5.551	17.723	1.32	0.11
8/28/96	13:12:59	18.776	5.435	18.776	1.21	0.10
8/28/96	13:14:06	19.891	5.334	19.891	1.10	0.09
8/28/96	13:15:17	21.073	5.239	21.073	1.01	0.08
8/28/96	13:16:32	22.325	5.156	22.325	0.93	0.07
8/28/96	13:17:51	23.650	5.080	23.650	0.85	0.07
8/28/96	13:19:16	25.055	5.008	25.055	0.78	0.06
8/28/96	13:20:45	26.543	4.948	26.543	0.72	0.06
8/28/96	13:22:20	28.118	4.898	28.118	0.67	0.05
8/28/96	13:24:00	29.786	4.852	29.786	0.62	0.05
8/28/96	13:25:46	31.555	4.810	31.555	0.58	0.05
8/28/96	13:27:38	33.428	4.780	33.428	0.55	0.04
8/28/96	13:29:37	35.411	4.752	35.411	0.52	0.04
8/28/96	13:31:43	37.513	4.727	37.513	0.50	0.04
8/28/96	13:33:57	39.740	4.709	39.740	0.48	0.04
8/28/96	13:36:18	42.098	4.690	42.098	0.46	0.04
8/28/96	13:38:48	44.596	4.676	44.596	0.45	0.04
8/28/96	13:41:27	47.243	4.662	47.243	0.43	0.03
8/28/96	13:44:15	50.046	4.653	50.046	0.42	0.03
8/28/96	13:47:13	53.015	4.642	53.015	0.41	0.03
8/28/96	13:50:22	56.160	4.632	56.160	0.40	0.03
8/28/96	13:53:42	59.491	4.623	59.491	0.39	0.03
8/28/96	13:57:14	63.020	4.619	63.020	0.39	0.03
8/28/96	14:00:58	66.758	4.609	66.758	0.38	0.03
8/28/96	14:04:56	70.718	4.605	70.718	0.38	0.03
8/28/96	14:09:07	74.911	4.600	74.911	0.37	0.03

HVORSLEV SLUG TEST ANALYSIS RISING HEAD TEST MW-18D

$$K = \frac{r_c^2}{2L_e} \ln \frac{L_e}{R_e} \left[\frac{\ln \left(\frac{h_1}{h_2} \right)}{(t_2 - t_1)} \right] 30.48$$

where: r_c = casing radius (feet)
 R_e = equivalent radius (feet)
 L_e = length of screened interval (feet)
 t = time (minutes)
 h_t = head at time t (feet)

INPUT PARAMETERS		RESULTS
r_c =	0.17	<div> <div>K= 1.90E-04 cm/sec</div> <div>K= 5.37E-01 ft/day</div> </div>
R_e =	0.33	
L_e =	6	
t_1 =	0	
t_2 =	85.9	
h_1/h_0 =	1.00	
h_2/h_0 =	0.01	



Project Name: 216 Paterson Plank Road Site, New Jersey
Project No.: 943-6222
Test Date: 08/28/96

Analysis By: SDM
Checked By: FG
Analysis Date: 1/17/97

RISING HEAD TEST MW-18D

WELL NO. MW-18D

DATE	8/28/96	
INITIAL DEPTH TO WATER	4.22	FEET (btoc)
CASING DIAMETER	4	INCHES
SAND DIAMETER	8	INCHES
TOP OF OPEN INTERVAL	60	FEET (btoc)
BOTTOM OF OPEN INTERVAL	66	FEET (btoc)
SATURATED THICKNESS	7	FEET
WATER TABLE TO BOTTOM OF SCREEN	61.78	FEET
EQUIVALENT DIAMETER	5.51	INCHES
OPEN INTERVAL LENGTH	6	FEET
STATIC IN SCREEN?	N	
MAX. HEAD CHANGE	37.06	FEET
MAX. HEAD IN SCREEN?	N	

DATE	TIME	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
	(HR:M:S)					
8/28/96	14:30:59	0.000	11.738	0.000	37.06	1.00
8/28/96	14:30:59	0.005	11.743	0.005	37.06	1.00
8/28/96	14:30:59	0.010	11.729	0.010	37.05	1.00
8/28/96	14:30:59	0.015	11.701	0.015	37.02	1.00
8/28/96	14:31:00	0.020	11.747	0.020	37.07	1.00
8/28/96	14:31:00	0.025	11.692	0.025	37.01	1.00
8/28/96	14:31:00	0.030	11.664	0.030	36.98	1.00
8/28/96	14:31:01	0.035	11.630	0.035	36.95	1.00
8/28/96	14:31:01	0.040	11.634	0.040	36.95	1.00
8/28/96	14:31:01	0.045	11.630	0.045	36.95	1.00
8/28/96	14:31:02	0.050	11.611	0.050	36.93	1.00
8/28/96	14:31:02	0.055	11.583	0.055	36.90	1.00
8/28/96	14:31:02	0.060	11.588	0.060	36.91	1.00
8/28/96	14:31:02	0.065	11.579	0.065	36.90	1.00
8/28/96	14:31:03	0.070	11.570	0.070	36.89	1.00
8/28/96	14:31:03	0.075	11.551	0.075	36.87	0.99
8/28/96	14:31:03	0.080	11.537	0.080	36.86	0.99
8/28/96	14:31:04	0.085	11.523	0.085	36.84	0.99
8/28/96	14:31:04	0.090	11.519	0.090	36.84	0.99
8/28/96	14:31:04	0.095	11.503	0.095	36.82	0.99
8/28/96	14:31:05	0.100	11.484	0.100	36.80	0.99
8/28/96	14:31:05	0.106	11.475	0.106	36.79	0.99
8/28/96	14:31:05	0.112	11.461	0.112	36.78	0.99
8/28/96	14:31:06	0.119	11.447	0.119	36.77	0.99
8/28/96	14:31:06	0.126	11.429	0.126	36.75	0.99
8/28/96	14:31:06	0.133	11.415	0.133	36.73	0.99
8/28/96	14:31:07	0.141	11.397	0.141	36.72	0.99
8/28/96	14:31:07	0.149	11.371	0.149	36.69	0.99
8/28/96	14:31:08	0.158	11.353	0.158	36.67	0.99
8/28/96	14:31:09	0.167	11.330	0.167	36.65	0.99
8/28/96	14:31:09	0.177	11.311	0.177	36.63	0.99
8/28/96	14:31:10	0.188	11.288	0.188	36.61	0.99
8/28/96	14:31:10	0.199	11.265	0.199	36.58	0.99
8/28/96	14:31:11	0.210	11.242	0.210	36.56	0.99
8/28/96	14:31:12	0.223	11.221	0.223	36.54	0.99
8/28/96	14:31:13	0.236	11.194	0.236	36.51	0.99
8/28/96	14:31:13	0.250	11.166	0.250	36.49	0.98
8/28/96	14:31:14	0.265	11.138	0.265	36.46	0.98
8/28/96	14:31:15	0.280	11.106	0.280	36.43	0.98

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	14:31:16	0.297	11.076	0.297	36.40	0.98
8/28/96	14:31:17	0.315	11.044	0.315	36.36	0.98
8/28/96	14:31:19	0.333	11.002	0.333	36.32	0.98
8/28/96	14:31:20	0.353	10.965	0.353	36.28	0.98
8/28/96	14:31:21	0.374	10.931	0.374	36.25	0.98
8/28/96	14:31:22	0.396	10.889	0.396	36.21	0.98
8/28/96	14:31:24	0.420	10.843	0.420	36.16	0.98
8/28/96	14:31:25	0.445	10.794	0.445	36.11	0.97
8/28/96	14:31:27	0.470	10.748	0.470	36.07	0.97
8/28/96	14:31:28	0.496	10.693	0.496	36.01	0.97
8/28/96	14:31:30	0.525	10.645	0.525	35.96	0.97
8/28/96	14:31:32	0.555	10.585	0.555	35.90	0.97
8/28/96	14:31:34	0.586	10.522	0.586	35.84	0.97
8/28/96	14:31:36	0.621	10.458	0.621	35.78	0.97
8/28/96	14:31:38	0.658	10.386	0.658	35.71	0.96
8/28/96	14:31:40	0.696	10.312	0.696	35.63	0.96
8/28/96	14:31:43	0.738	10.236	0.738	35.56	0.96
8/28/96	14:31:45	0.781	10.153	0.781	35.47	0.96
8/28/96	14:31:48	0.828	10.068	0.828	35.39	0.95
8/28/96	14:31:51	0.876	9.978	0.876	35.30	0.95
8/28/96	14:31:54	0.928	9.876	0.928	35.20	0.95
8/28/96	14:31:57	0.983	9.773	0.983	35.09	0.95
8/28/96	14:32:01	1.041	9.664	1.041	34.98	0.94
8/28/96	14:32:05	1.103	9.551	1.103	34.87	0.94
8/28/96	14:32:09	1.168	9.427	1.168	34.75	0.94
8/28/96	14:32:13	1.238	9.300	1.238	34.62	0.93
8/28/96	14:32:17	1.311	9.168	1.311	34.49	0.93
8/28/96	14:32:22	1.390	9.023	1.390	34.34	0.93
8/28/96	14:32:27	1.473	8.873	1.473	34.19	0.92
8/28/96	14:32:32	1.561	8.714	1.561	34.03	0.92
8/28/96	14:32:38	1.655	8.548	1.655	33.87	0.91
8/28/96	14:32:44	1.753	8.370	1.753	33.69	0.91
8/28/96	14:32:50	1.858	8.183	1.858	33.50	0.90
8/28/96	14:32:57	1.968	7.987	1.968	33.31	0.90
8/28/96	14:33:04	2.085	7.784	2.085	33.10	0.89
8/28/96	14:33:11	2.210	7.565	2.210	32.88	0.89
8/28/96	14:33:19	2.341	7.339	2.341	32.66	0.88
8/28/96	14:33:27	2.481	7.097	2.481	32.42	0.87
8/28/96	14:33:36	2.630	6.848	2.630	32.17	0.87
8/28/96	14:33:46	2.786	6.580	2.786	31.90	0.86
8/28/96	14:33:56	2.953	6.299	2.953	31.62	0.85
8/28/96	14:34:06	3.130	5.999	3.130	31.32	0.85
8/28/96	14:34:17	3.316	5.694	3.316	31.01	0.84
8/28/96	14:34:29	3.515	5.367	3.515	30.69	0.83
8/28/96	14:34:42	3.725	5.021	3.725	30.34	0.82
8/28/96	14:34:55	3.946	4.626	3.946	29.95	0.81
8/28/96	14:35:09	4.181	4.253	4.181	29.57	0.80
8/28/96	14:35:24	4.430	3.863	4.430	29.18	0.79
8/28/96	14:35:40	4.693	3.452	4.693	28.77	0.78
8/28/96	14:35:57	4.973	3.030	4.973	28.35	0.77
8/28/96	14:36:15	5.270	2.580	5.270	27.90	0.75
8/28/96	14:36:33	5.583	2.114	5.583	27.43	0.74
8/28/96	14:36:53	5.915	1.632	5.915	26.95	0.73
8/28/96	14:37:14	6.266	1.123	6.266	26.44	0.71
8/28/96	14:37:37	6.640	0.594	6.640	25.91	0.70
8/28/96	14:38:01	7.035	0.050	7.035	25.37	0.68

DATE	TIME (HR:M:S)	EVENT ELAPSED TIME (MIN)	DEPTH TO WATER (FEET)	TEST ELAPSED TIME (MIN)	HEAD (FEET)	HEAD RATIO
8/28/96	14:38:26	7.453	-0.520	7.453	24.80	0.67
8/28/96	14:38:52	7.896	-1.113	7.896	24.21	0.65
8/28/96	14:39:20	8.366	-1.721	8.366	23.60	0.64
8/28/96	14:39:50	8.865	-2.356	8.865	22.96	0.62
8/28/96	14:40:22	9.391	-3.016	9.391	22.30	0.60
8/28/96	14:40:55	9.950	-3.689	9.950	21.63	0.58
8/28/96	14:41:31	10.541	-4.388	10.541	20.93	0.56
8/28/96	14:42:09	11.168	-5.122	11.168	20.20	0.55
8/28/96	14:42:48	11.831	-5.883	11.831	19.44	0.52
8/28/96	14:43:31	12.535	-6.630	12.535	18.69	0.50
8/28/96	14:44:15	13.280	-7.391	13.280	17.93	0.48
8/28/96	14:45:03	14.070	-8.169	14.070	17.15	0.46
8/28/96	14:45:53	14.906	-8.953	14.906	16.37	0.44
8/28/96	14:46:46	15.791	-9.742	15.791	15.58	0.42
8/28/96	14:47:42	16.730	-10.538	16.730	14.78	0.40
8/28/96	14:48:42	17.723	-11.331	17.723	13.99	0.38
8/28/96	14:49:45	18.776	-12.127	18.776	13.19	0.36
8/28/96	14:50:52	19.891	-12.907	19.891	12.41	0.33
8/28/96	14:52:03	21.073	-13.679	21.073	11.64	0.31
8/28/96	14:53:18	22.325	-14.429	22.325	10.89	0.29
8/28/96	14:54:37	23.650	-15.183	23.650	10.14	0.27
8/28/96	14:56:02	25.055	-15.901	25.055	9.42	0.25
8/28/96	14:57:31	26.543	-16.560	26.543	8.76	0.24
8/28/96	14:59:06	28.118	-17.178	28.118	8.14	0.22
8/28/96	15:00:46	29.786	-17.746	29.786	7.57	0.20
8/28/96	15:02:32	31.555	-18.263	31.555	7.06	0.19
8/28/96	15:04:24	33.428	-18.733	33.428	6.59	0.18
8/28/96	15:06:23	35.411	-19.137	35.411	6.18	0.17
8/28/96	15:08:29	37.513	-19.490	37.513	5.83	0.16
8/28/96	15:10:43	39.740	-19.787	39.740	5.53	0.15
8/28/96	15:13:04	42.098	-20.030	42.098	5.29	0.14
8/28/96	15:15:34	44.596	-20.230	44.596	5.09	0.14
8/28/96	15:18:13	47.243	-20.387	47.243	4.93	0.13
8/28/96	15:21:01	50.046	-20.509	50.046	4.81	0.13
8/28/96	15:23:59	53.015	-20.611	53.015	4.71	0.13
8/28/96	15:27:08	56.160	-20.685	56.160	4.63	0.13
8/28/96	15:30:28	59.491	-20.742	59.491	4.58	0.12
8/28/96	15:34:00	63.020	-20.793	63.020	4.53	0.12
8/28/96	15:37:44	66.758	-20.835	66.758	4.48	0.12
8/28/96	15:41:42	70.718	-20.871	70.718	4.45	0.12
8/28/96	15:45:53	74.911	-20.899	74.911	4.42	0.12
8/28/96	15:50:20	79.355	-20.922	79.355	4.40	0.12
8/28/96	15:55:02	84.061	-20.941	84.061	4.38	0.12
8/28/96	16:00:01	89.046	-20.959	89.046	4.36	0.12
8/28/96	16:05:01	94.046	-20.978	94.046	4.34	0.12
8/28/96	16:10:01	99.046	-20.987	99.046	4.33	0.12
8/28/96	16:15:01	104.046	-20.996	104.046	4.32	0.12
8/28/96	16:20:01	109.046	-21.005	109.046	4.31	0.12
8/28/96	16:25:01	114.046	-21.019	114.046	4.30	0.12

APPENDIX E

Geophysical Testing Procedures, Data, and Results

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LIST OF ATTACHMENTS

Attachment E-1 - Acoustic and Gamma Logging Report

E. Geophysical Testing

E.1 General

The geophysical testing program included the following downhole logging procedures: temperature logging, caliper logging, downhole flowmeter measurements, downhole camera investigation, acoustic logging and natural gamma logging. Geophysical investigations were conducted in the following boreholes/monitoring wells:

Well	Temperature Logging	Caliper Logging	Downhole Flowmeter Measurements	Downhole Camera Investigation	Acoustic Logging	Natural Gamma Logging
MW-2D				X	X	X
MW-2R				X	X	X
MW-5D			X	X	X	X
MW-7D			X	X	X	X
MW-8R	X	X	X	X		
MW-11D				X	X	X
MW-14D					X	X
MW-18D					X	X

The following sections include a description of the instruments and methodology used for downhole logging and present the results of the geophysical testing.

E.2 Downhole Temperature and Caliper Logging

Temperature and caliper measurements were conducted in the open corehole MW-8R. A Mt. Sopris Model MGX Digital Logger was used to performed the borehole geophysical logging. The logger consists of an interface/power supply and a hoist/cable reel. The interface/power supply contains the controls for the probe and provides the link between the probe and a portable computer. The hoist/cable reel is motorized and contains a sensor which measures the amount of cable which is unwound to determine the exact elevation of the probe in the hole. The probe was suspended in the center of the hole using a tripod-mounted pulley.

The downhole temperature and caliper logging was conducted using a CTP-2292 3-arm caliper and fluid temperature probe. The probe was attached to the Mt. Sopris Model MGX Digital Logger and the temperature of the borehole fluid was recorded while the probe was lowered into the open borehole MW-8R. The caliper logging was conducted by slowly removing the probe once the bottom of the borehole was reached. The results of temperature and caliper logging are presented in Figure E-1. This investigation method identified a zone with higher temperature gradients at a depth of about 110 feet below ground surface (bgs). The probe and cable spool were decontaminated prior to use.

E.3 Downhole Flowmeter Logging

The probe used for the downhole flowmeter logging was a Heat Pulse Flowmeter Model HFP-4293 provided by Colog, Inc. (Colog) of Golden, Colorado. The flowmeter emits a pulse of heat from the center of the probe when a signal is received from the operator. Sensors located above and below the emitter measure the heat pulse as it arrives. A heat pulse received by the lower sensor indicates downward gradients and a heat pulse received by the upper sensor indicates upward gradients. The time delay required for the pulse to reach the sensors indicates the magnitude of the gradients. A series of flexible discs center the instrument in the borehole and seal the space between the probe and the borehole wall. This directs all groundwater flow through the instrument. The probe was attached to the Mt. Sopris Model MGX Digital Logger. The interface/power supply was connected to a portable computer to display and record the digital data.

Since the probe is stationary for flowmeter testing, multiple runs were required for each hole. At least two tests were run at each depth. A test consisted of waiting for the water to stabilize in the borehole, "firing" the heat pulse, and then recording the heat signature. When sufficient data was obtained, the probe was moved to the next location and the procedure repeated. Testing of the hole was complete when the entire open borehole or screened interval was tested. The tests were performed approximately every 5 feet. Flowmeter measurements were conducted initially under static conditions and then in hydrodynamic conditions by pumping at a constant rate from the borehole/well using a Grundfos RediFlo-2 submersible pump located above the screened interval or open portion of the borehole. The probe, cable spool, portable logger and the pump were decontaminated prior to use at each borehole.

suspended on a sheathed cable which was marked at five foot intervals. The camera and light were manually lowered into each well as the depth was manually entered into the character generator every five feet. The camera and light were advanced into the borehole at a rate low enough as to not cause increases in the turbidity of the water. When the bottom of the borehole was reached, the procedure was repeated in the upward direction. The camera, light and cable were decontaminated prior to use at each borehole.

The downhole video investigation identified the presence of a separate phase liquid in well MW-11D. At the same well, the downhole video indicated a potential discrepancy between the installation log and the measured top of the well screen. In addition, the downhole video indicated that the casing of monitoring well MW-2R may not be fully grouted at the contact with the bedrock. To further evaluate these findings acoustic and natural gamma logging was conducted as described in Section E.5 and Attachment E-1.

E.5 Acoustic and Natural Gamma Logging

Acoustic and Natural Gamma logging was performed by Colog, Inc. of Golden, Colorado under the supervision of Golder Associates personnel. For the acoustic logging, Colog collected full waveform sonic data using a Mt. Sopris Instrument Company sonic logging probe. The probe consisted of a transmitter and a receiver with a spacing of 4 feet. The natural gamma logging was performed using a Mt. Sopris Instrument Company Model ALP-S Natural Gamma Probe. The probes were suspended in the hole via a motorized hoist/cable which measured the elevation of the probes. The hoist/cable assembly also contained an interface unit which transferred information from the probes and the hoist level sensor to a portable computer. The interface/power supply was connected to a portable computer to display and record the digital data. The computer was connected to a portable printer for review of logs in the field.

In accordance with standard logging procedures, logging runs were performed from the bottom of the boring upwards. This facilitated maintenance of a constant logging speed, since the probe is more likely to catch on uneven portions of the borehole walls while being lowered down the boring. A logging speed of approximately 1.5 feet per minute was used for the natural gamma runs and 6.0 feet per minute for the acoustic runs. The probes and the hoist/cable assembly were decontaminated prior to use at each borehole.

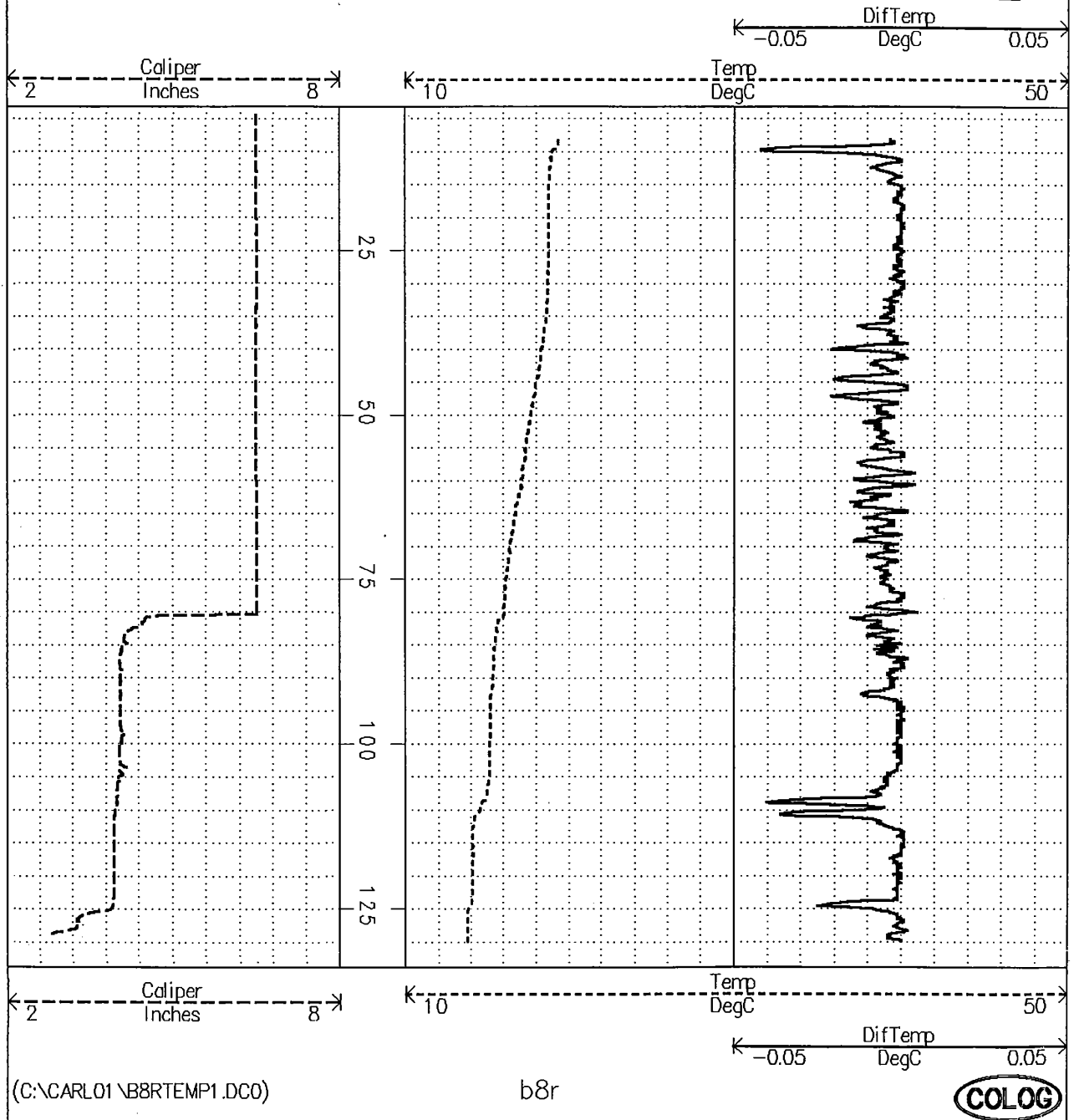
The results of the acoustic and natural gamma logging are presented as Attachment E-1 to this appendix.

FILE: \R\REPORT\GP_PROCE.DOC

(C:\CARL01\B8RTEMP1.DC0)

b8r

COLOG



JAN 22 1997

JOB No.:	943-6222	SCALE:	AS SHOWN
DR BY:	MRM	DATE:	01/22/97
CHK BY:	MME	FILE No.:	NJ03-628
REV BY:	FG	DR SUBTITLE:	11

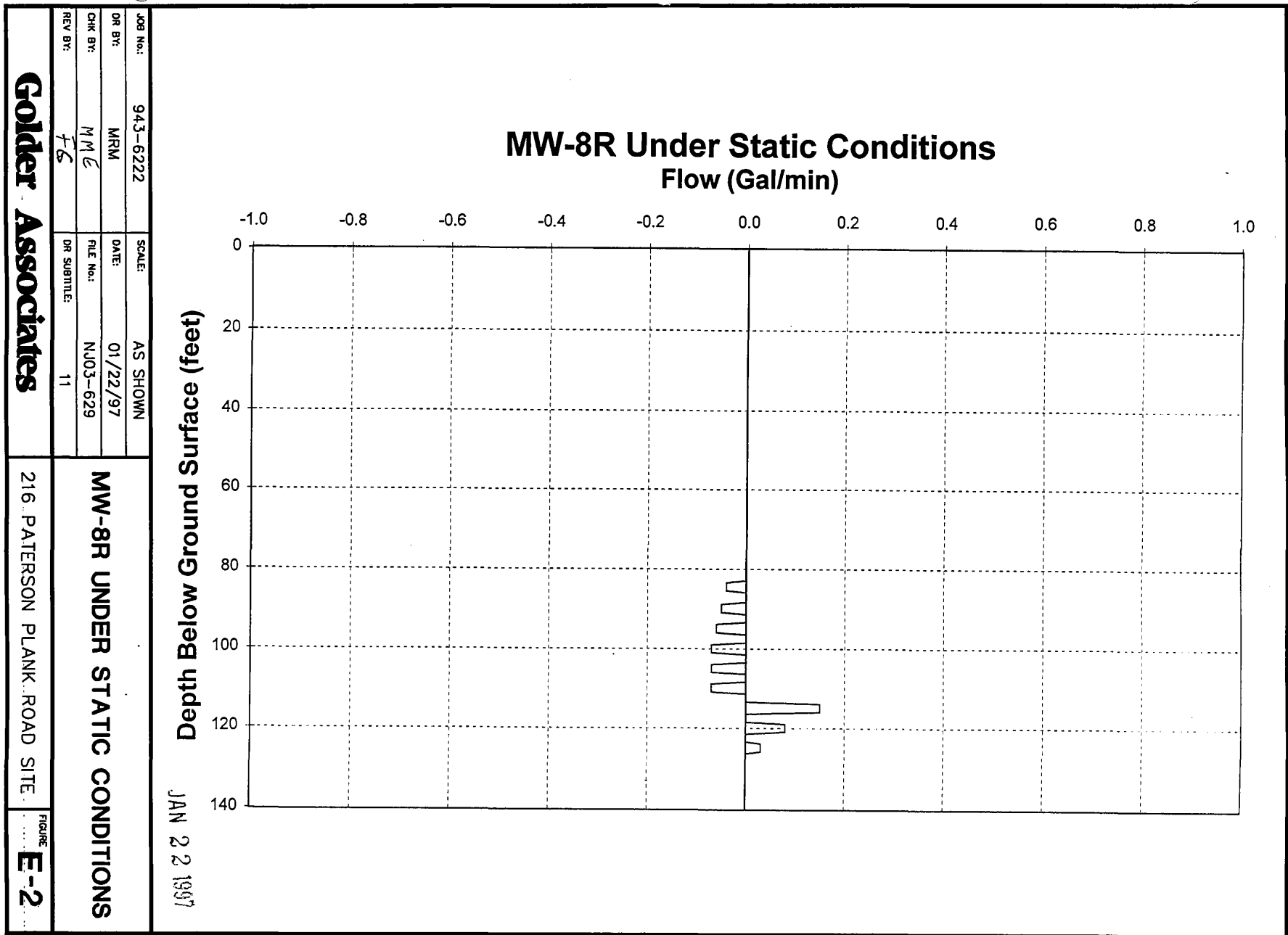
CALIPER AND TEMPERATURE LOGGING - BOREHOLE MW-8R

Golder Associates

216. PATERSON PLANK ROAD SITE

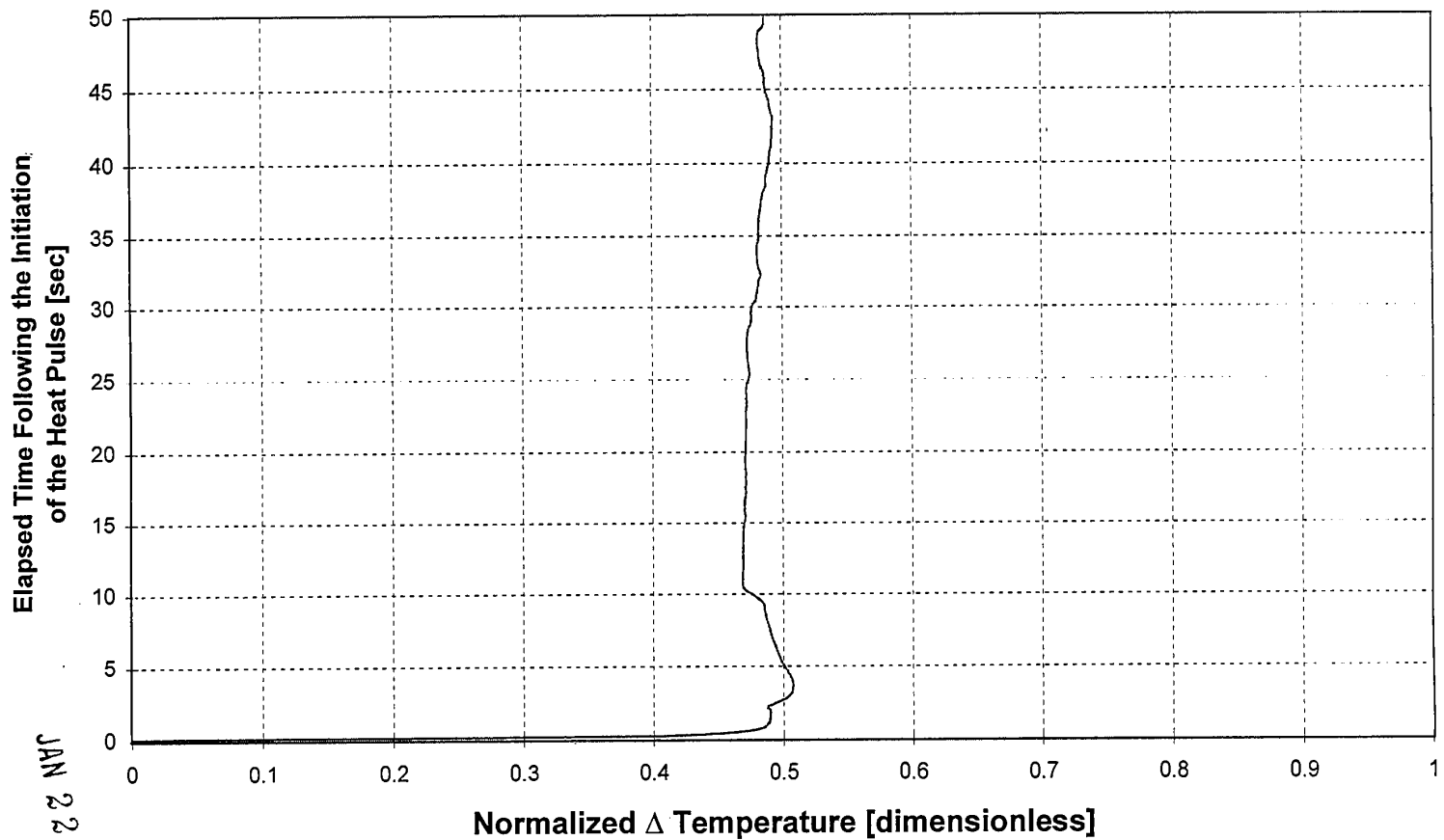
FIGURE **E-1**

R2-0000500



JAN 22 1997

MW-8R Under Static Conditions 120.1 ft BGS



JOB No.:	943-6222	SCALE:	AS SHOWN
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CHK BY:	ME	FILE No.:	NJ03-630
REV BY:	FC	DR SUBTITLE:	11

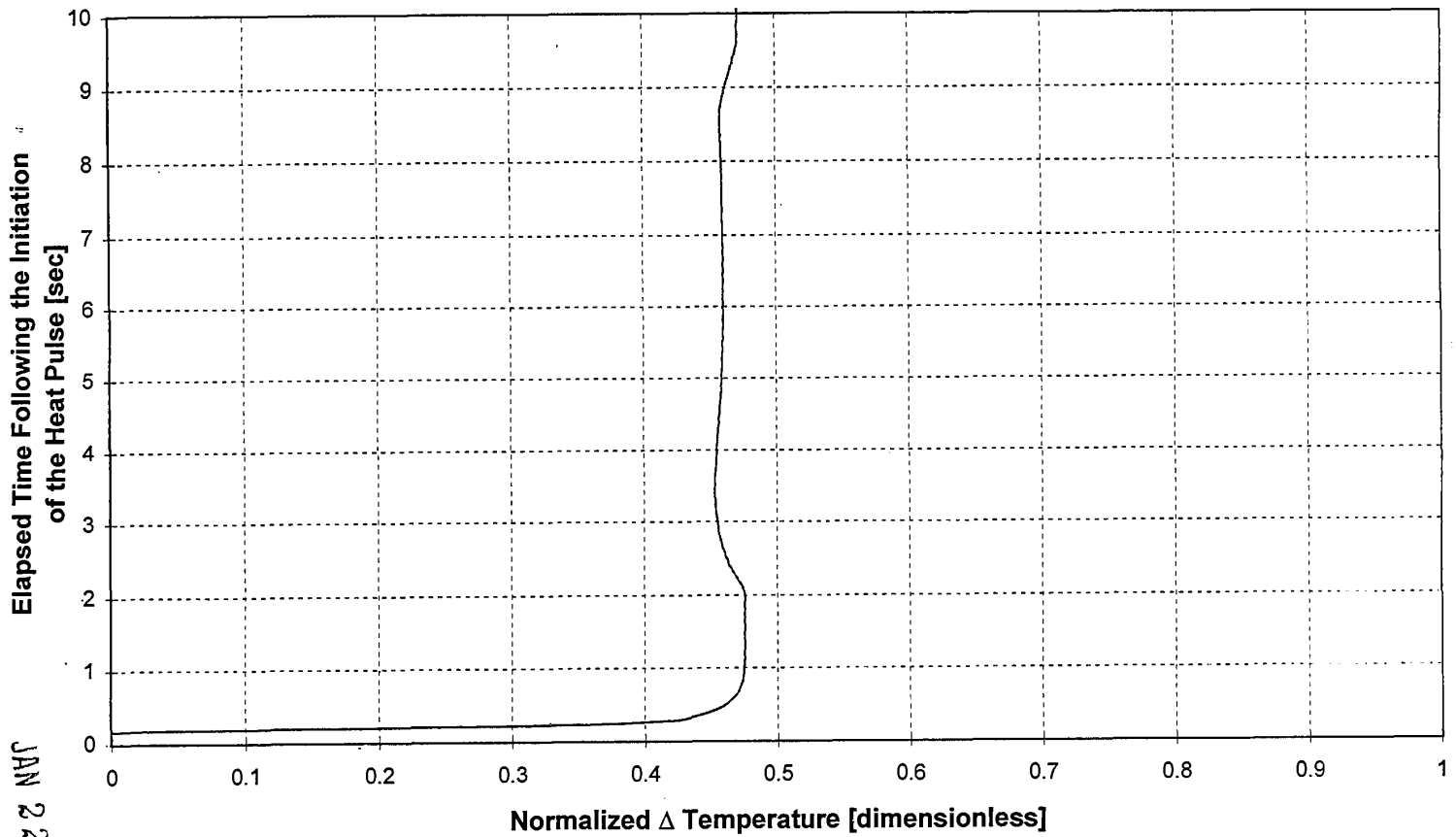
MW-8R HEAT PULSE
WAVEFORM UNDER STATIC
CONDITIONS - 120.1 ft. BGS

Golder Associates

216 PATERSON PLANK ROAD, SITE

FIGURE
E-3

MW-8R Under Static Conditions 110.0 ft BGS



JOB No.:	943-6222	SCALE:	AS SHOWN
DR BY:	MRM	DATE:	01/22/97
CHK BY:	MME	FILE No.:	NJ03-631
REV BY:	FG	DR SUBMIT:	11

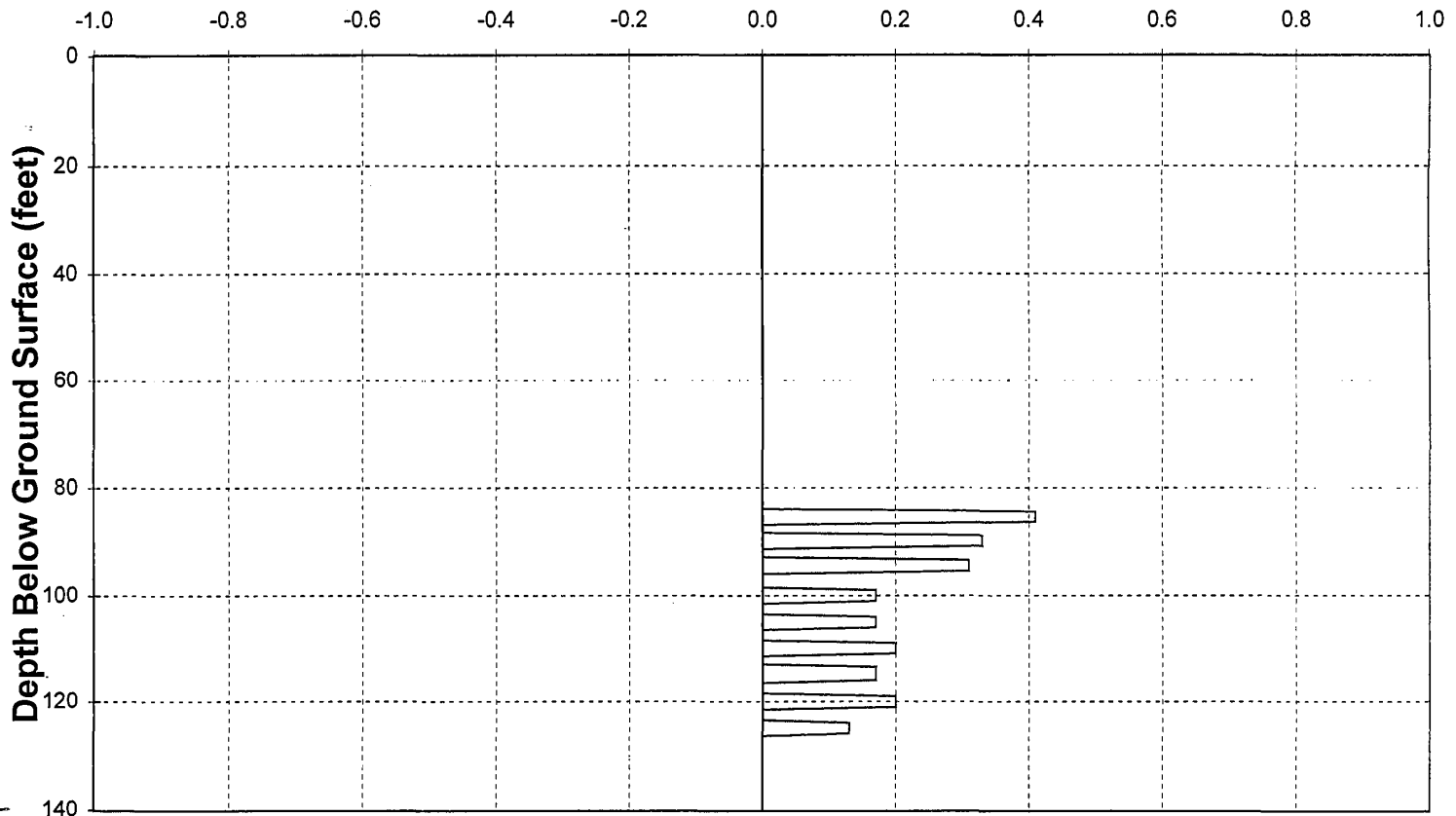
MW-8R HEAT PULSE
WAVEFORM UNDER STATIC
CONDITIONS - 110.0 ft. BGS

Golder Associates

216 PATTERSON PLANK ROAD SITE

FIGURE
E-4

MW-8R Under Pumping Conditions Flow (Gal/min)



JAN 22 1997

JOB No:	943-6222	SCALE:	AS SHOWN
DR BY:	MRM	DATE:	01/22/97
CHK BY:	MME	FILE No:	NJ03-632
REV BY:	FG	DR SUBTITLE:	11

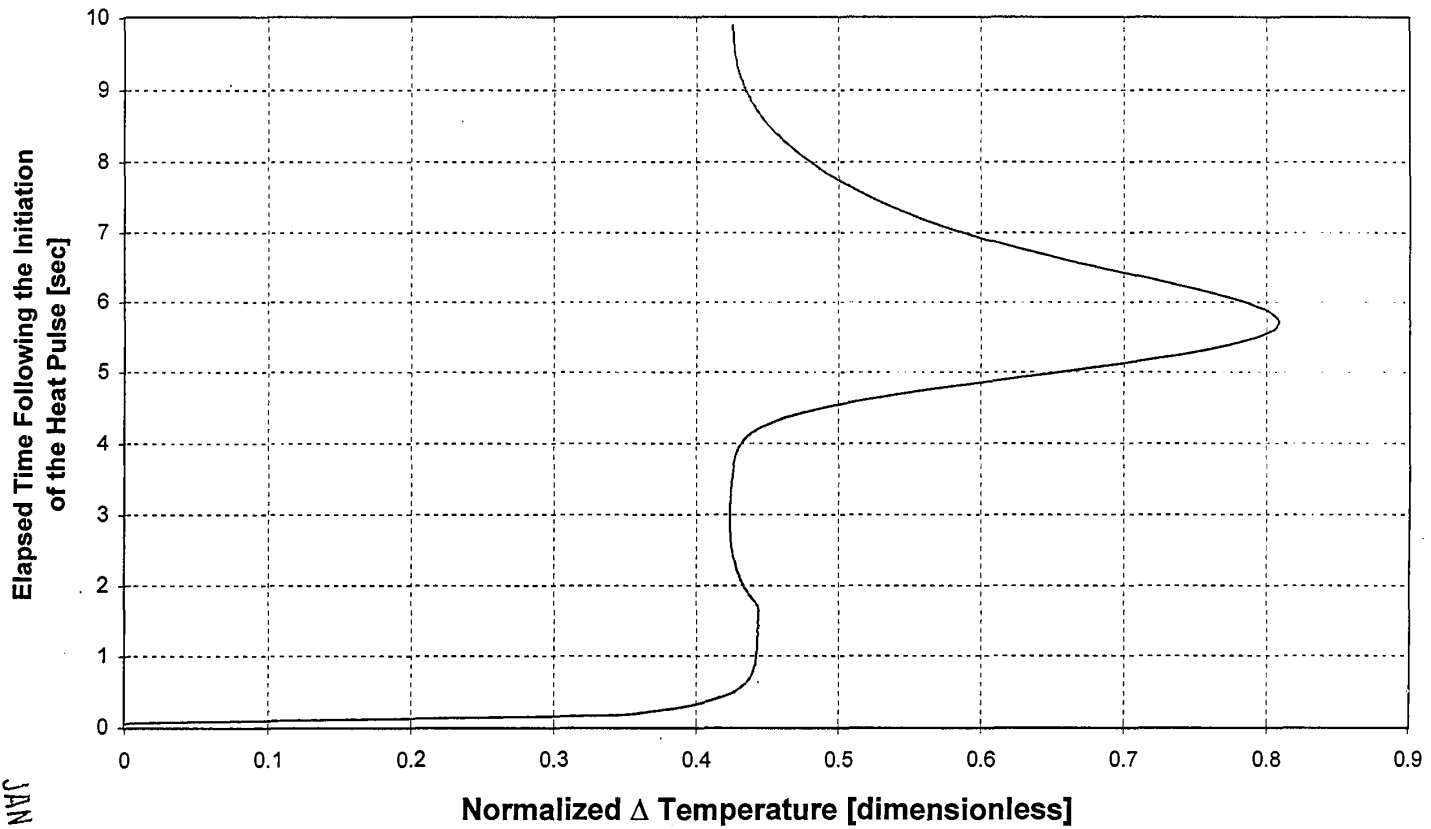
MW-8R UNDER PUMPING CONDITIONS

Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE
E-5

MW-8R Under Pumping Conditions 125.0 ft BGS



JAN 22 1997

JOB No.:	943-6222	SCALE:	AS SHOWN
DR BY:	MRM	DATE:	01/22/97
CHK BY:	MM	FILE No.:	NJ03-633
REV BY:	FG	DR SUBTITLE:	11

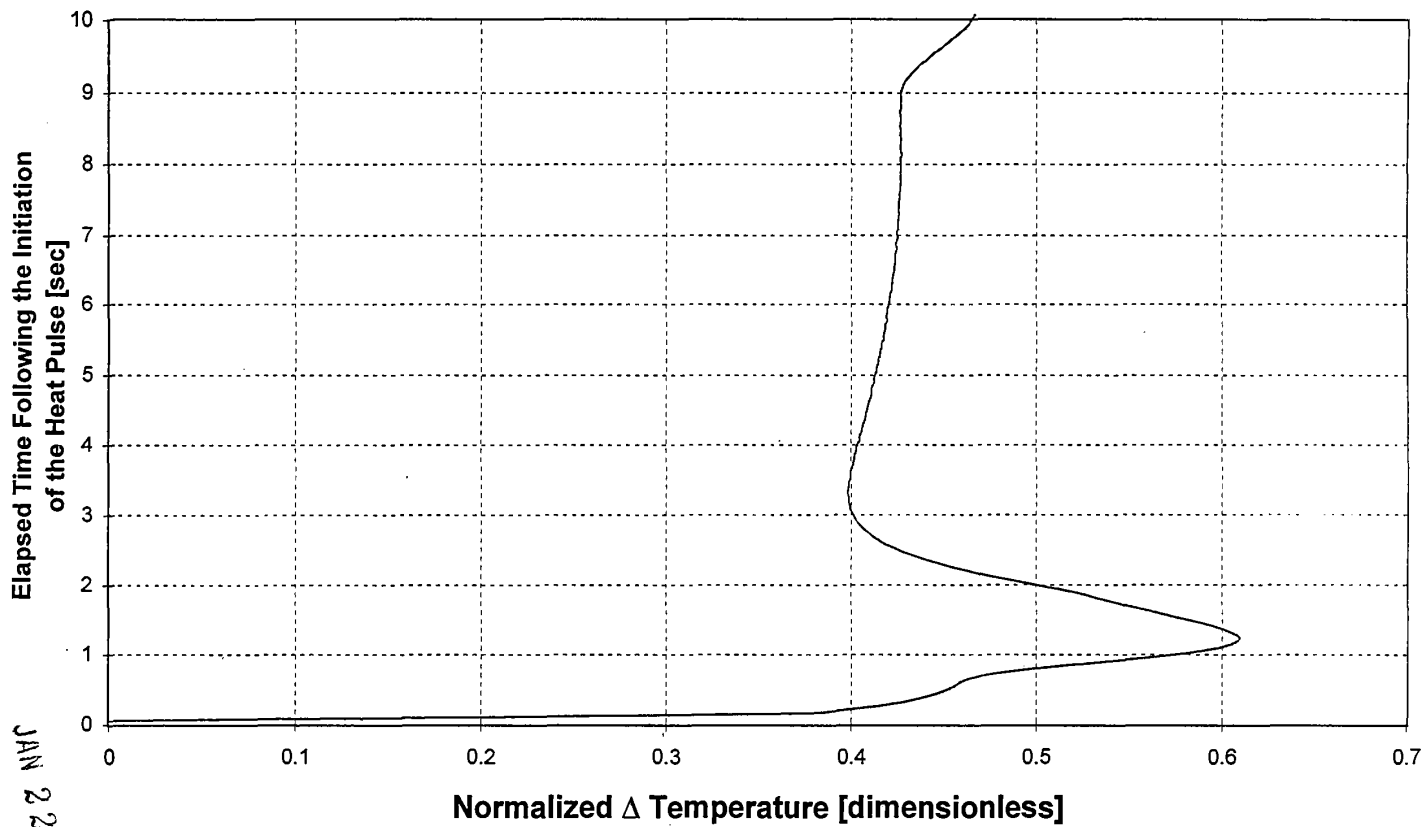
**MW-8R HEAT PULSE
WAVEFORM UNDER PUMPING
CONDITIONS - 125.0 ft. BGS**

Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE **E-6**

MW-8R Under Pumping Conditions 84.9 ft BGS



JOB No:	943-6222	SCALE:	AS SHOWN
DR BY:	MRM	DATE:	01/22/97
CHK BY:	ME	FILE No.:	NJ03-634
REV BY:	LC	DR SUBTITLE:	11

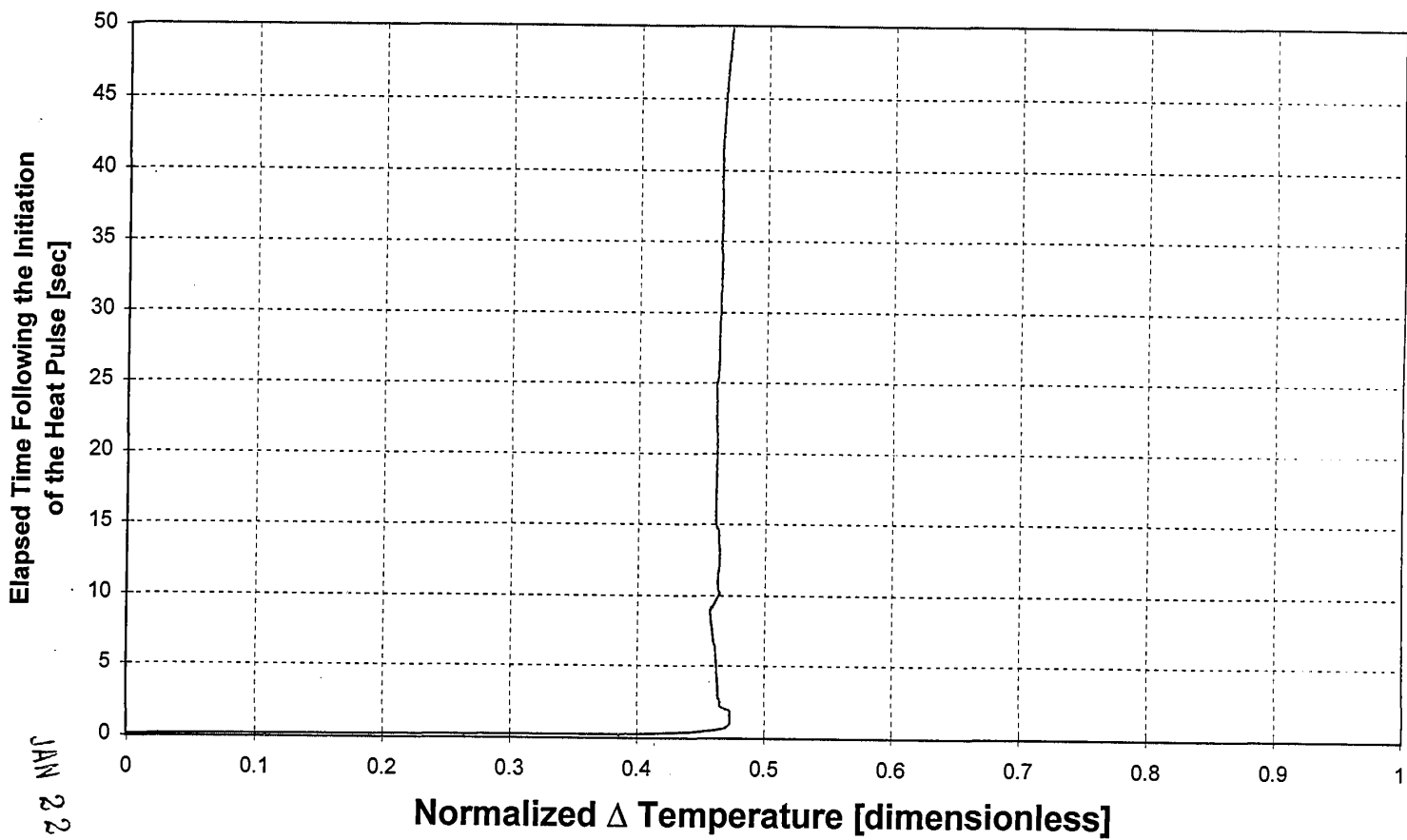
MW-8R HEAT PULSE
WAVEFORM UNDER PUMPING
CONDITIONS - 84.9 ft. BGS

Golder Associates

216 PATERSON PLANK ROAD, SITE

FIGURE
E-7

MW-5D Under Static Conditions 64.7 ft BGS



JOB No.:	943-6222	SCALE:	AS SHOWN
DR BY:	MRM	DATE:	01/22/97
CHK BY:	MMG	FILE No.:	N103-635
REV BY:	FG	DR SUBMIT:	11

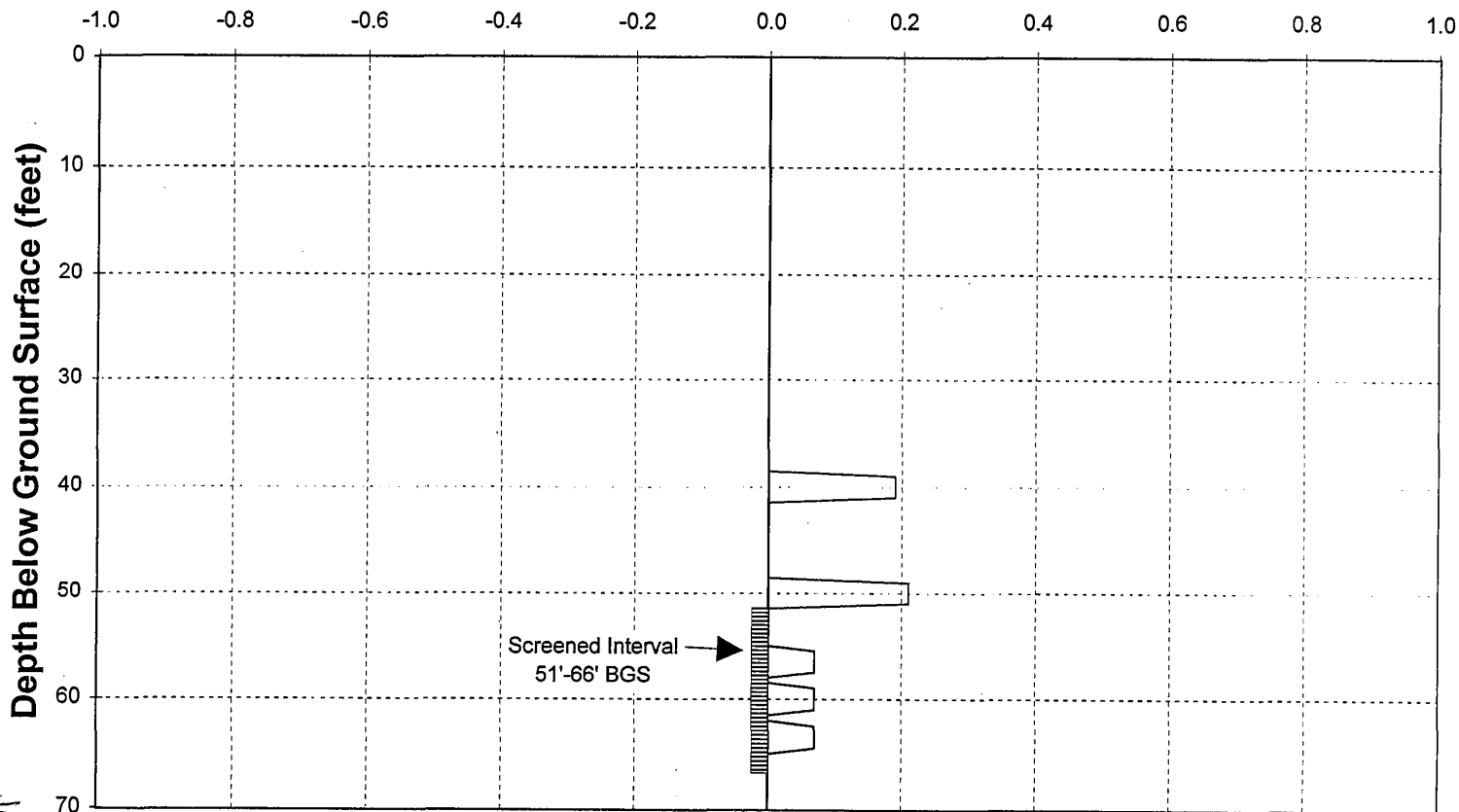
MW-5D HEAT PULSE
WAVEFORM UNDER STATIC
CONDITIONS - 64.7 ft. BGS

Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE E-8

MW-5D Under Pumping Conditions **Flow (Gal/min)**



Screened Interval
 51'-66' BGS

Depth Below Ground Surface (feet)

JAN 22 1997

JOB No.:	943-6222	SCALE:	AS SHOWN
DR BY:	MRM	DATE:	01/22/97
CHK BY:	MM	FILE No.:	NJ03-636
REV BY:	FG	DR SUBMIT:	11

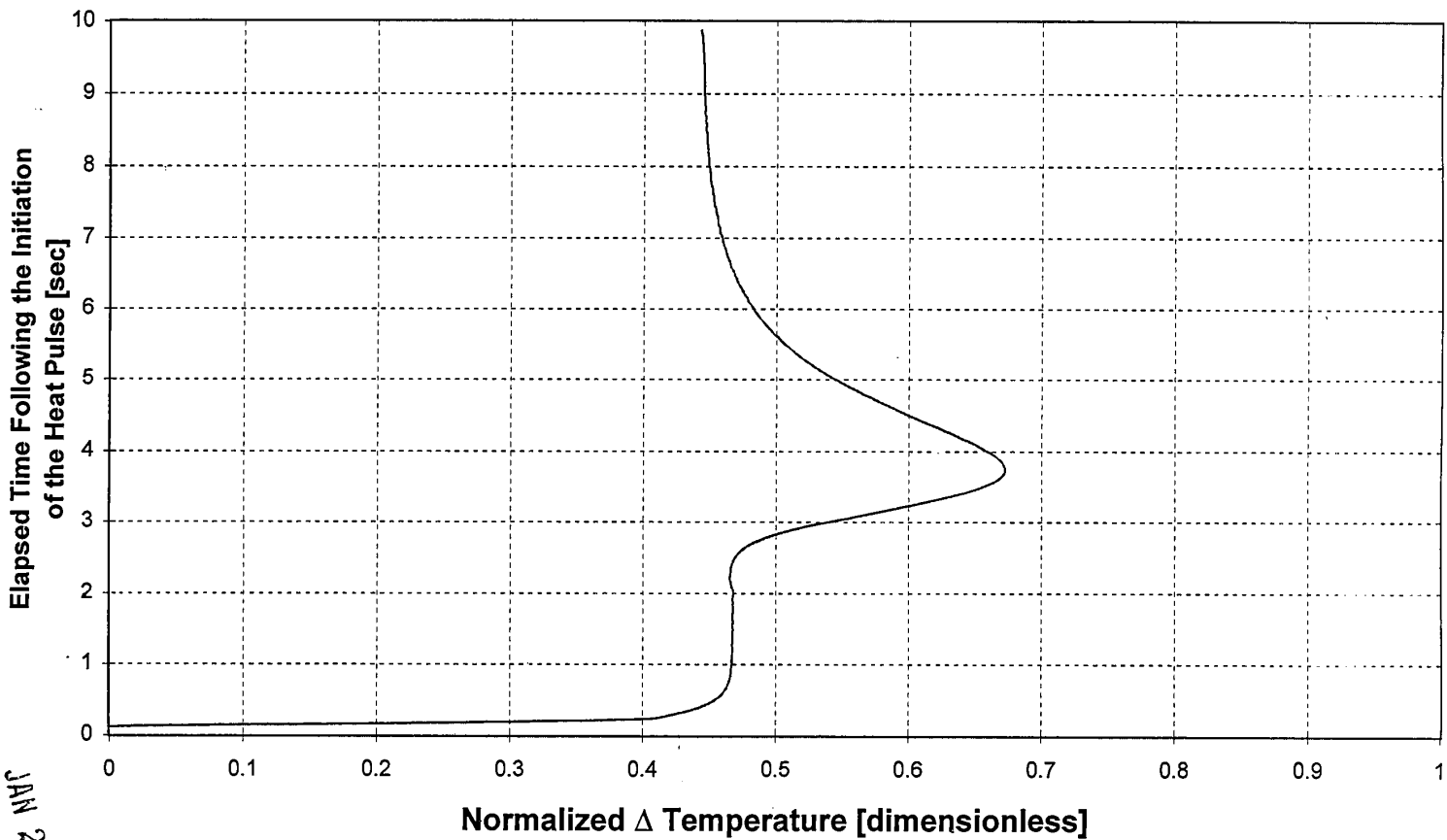
MW-5D UNDER PUMPING CONDITIONS

Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE
E-9

MW-5D Under Pumping Conditions 60.0 ft BGS



JAN 22 1997

JOB No.:	943-6222	SCALE:	AS SHOWN
DR BY:	MRM	DATE:	01/22/97
CHK BY:	HME	FILE No.:	NJ03-637
REV BY:	FC	DR SUBTITLE:	11

MW-5D HEAT PULSE
WAVEFORM UNDER PUMPING
CONDITIONS - 60.0 ft. BGS

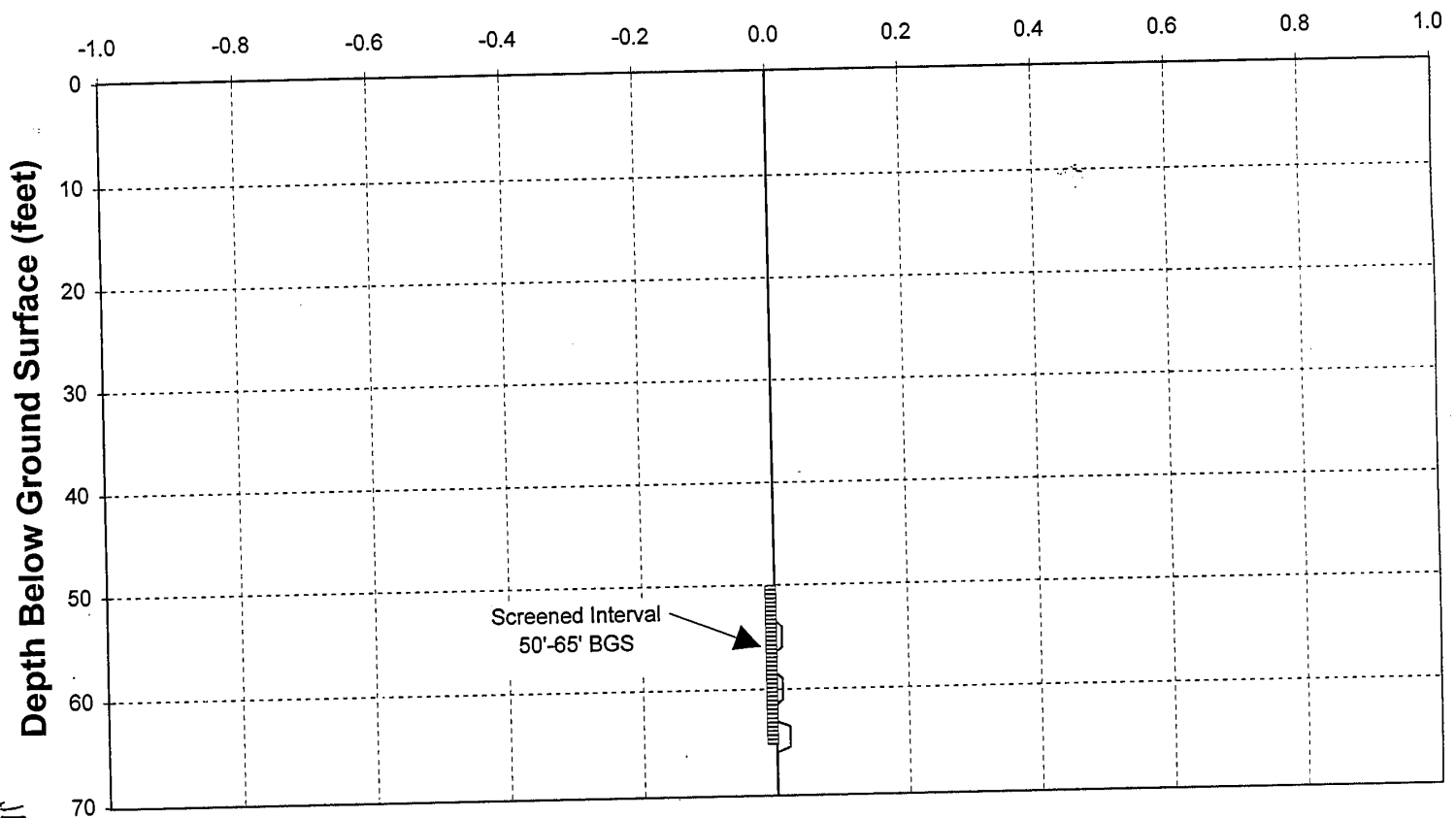
Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE E-10

MW-7D Under Static Conditions

Flow (Gal/min)



JAN 22 1997

JOB No.: 943-6222

SCALE: AS SHOWN

DR BY: MRM

DATE: 01/22/97

CHK BY: MME

FILE No.: NJ03-638

REV BY: FG

DR SUBTITLE: 11

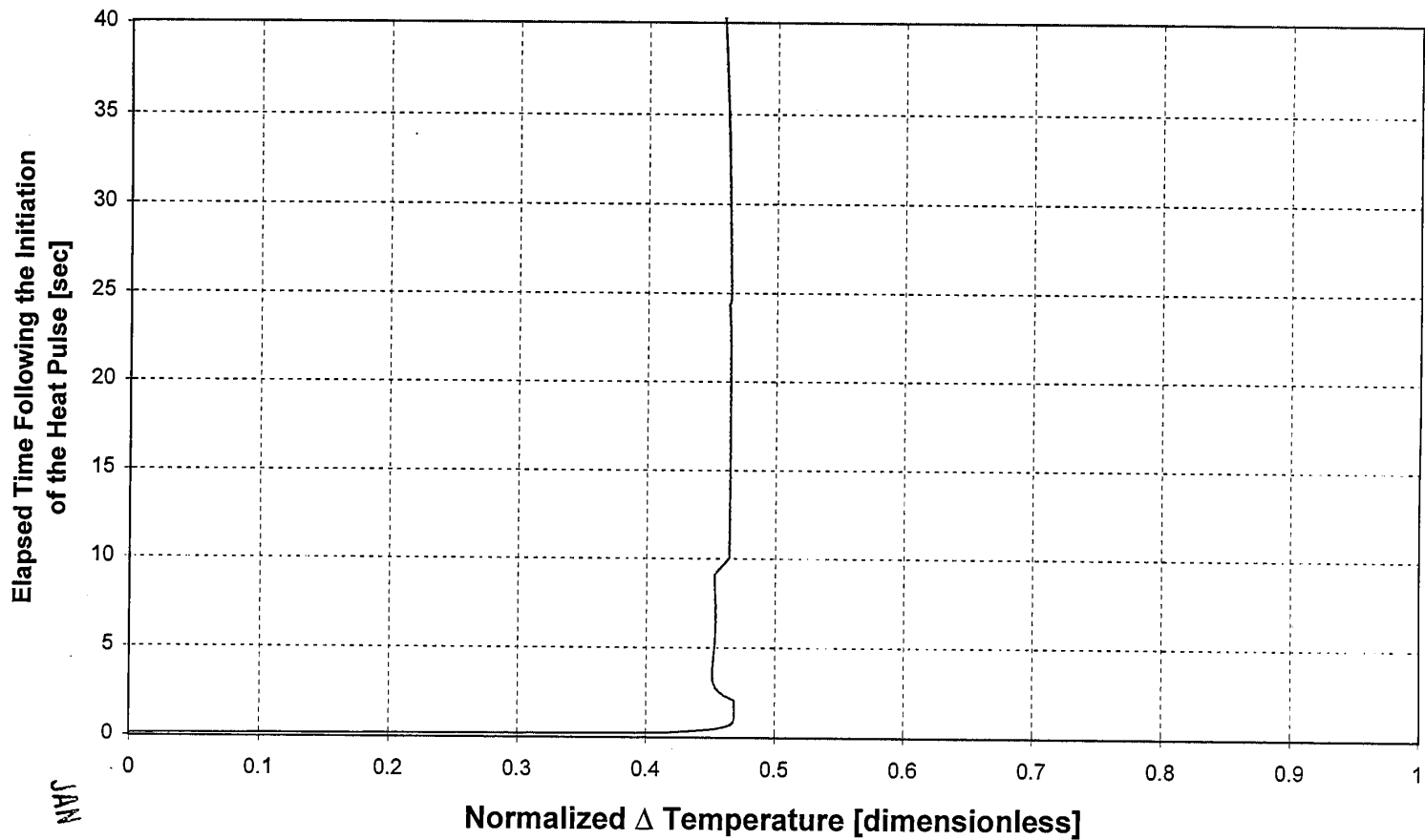
MW-7D UNDER STATIC CONDITIONS

Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE E-11

MW-7D Under Static Conditions 50.1 ft BGS



JOB No.:	943-6222	SCALE:	AS SHOWN
DR BY:	MRM	DATE:	01/22/97
CHK BY:	MME	FILE No.:	NJ03-639
REV BY:	F ₆	DR SUBTITLE:	11

MW-7D HEAT PULSE
WAVEFORM UNDER STATIC
CONDITIONS - 50.1 ft. BGS

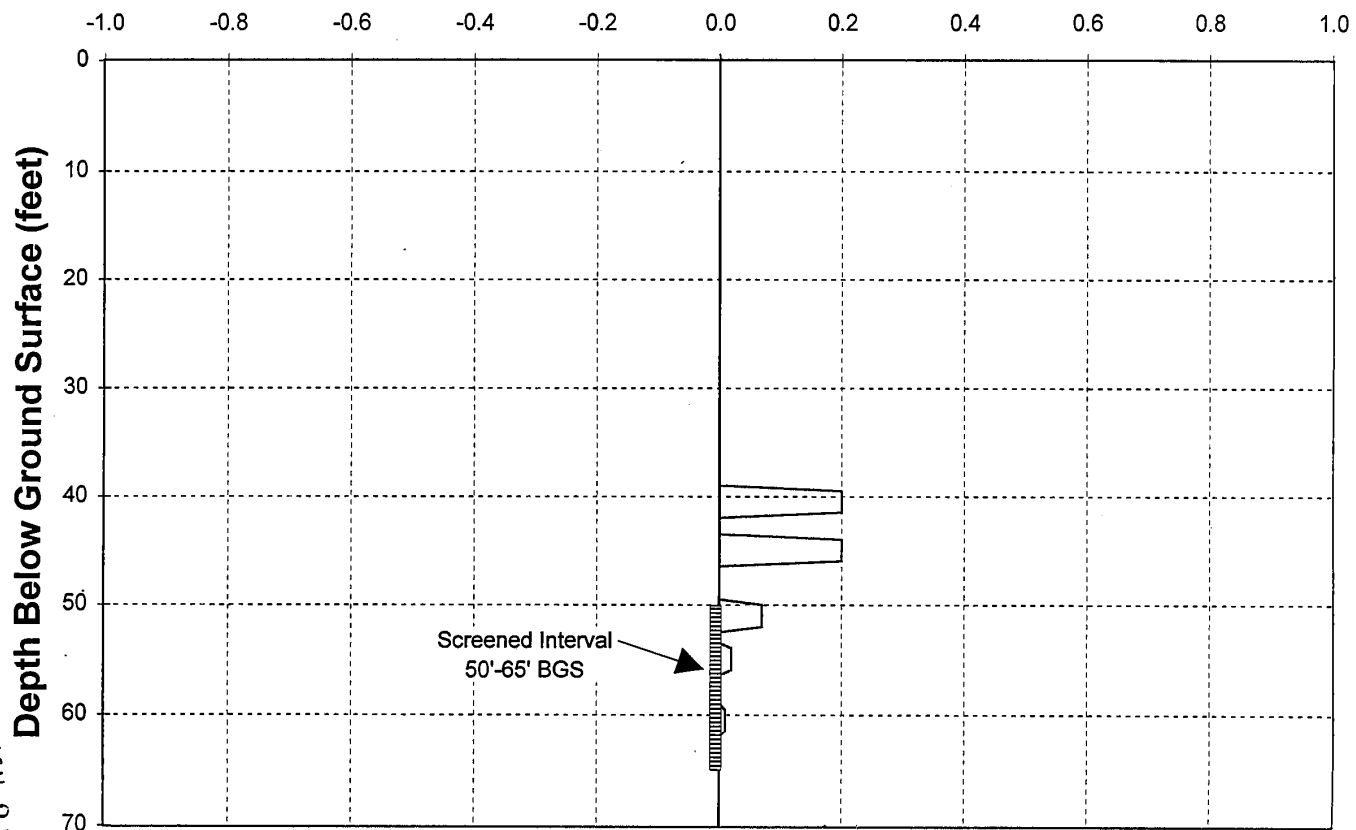
Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE
E-12

MW-7D Under Pumping Conditions

Flow (Gal/min)



JAN 22 1997

JOB No.: 943-6222

DR BY: MRM

CHK BY: MMF

REV BY: **FE**

SCALE: AS SHOWN

DATE: 01/22/97

FILE NO.: NJ03-640

DR SUBMITTEE:	11
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BMW-7D UNDER PUMPING CONDITIONS

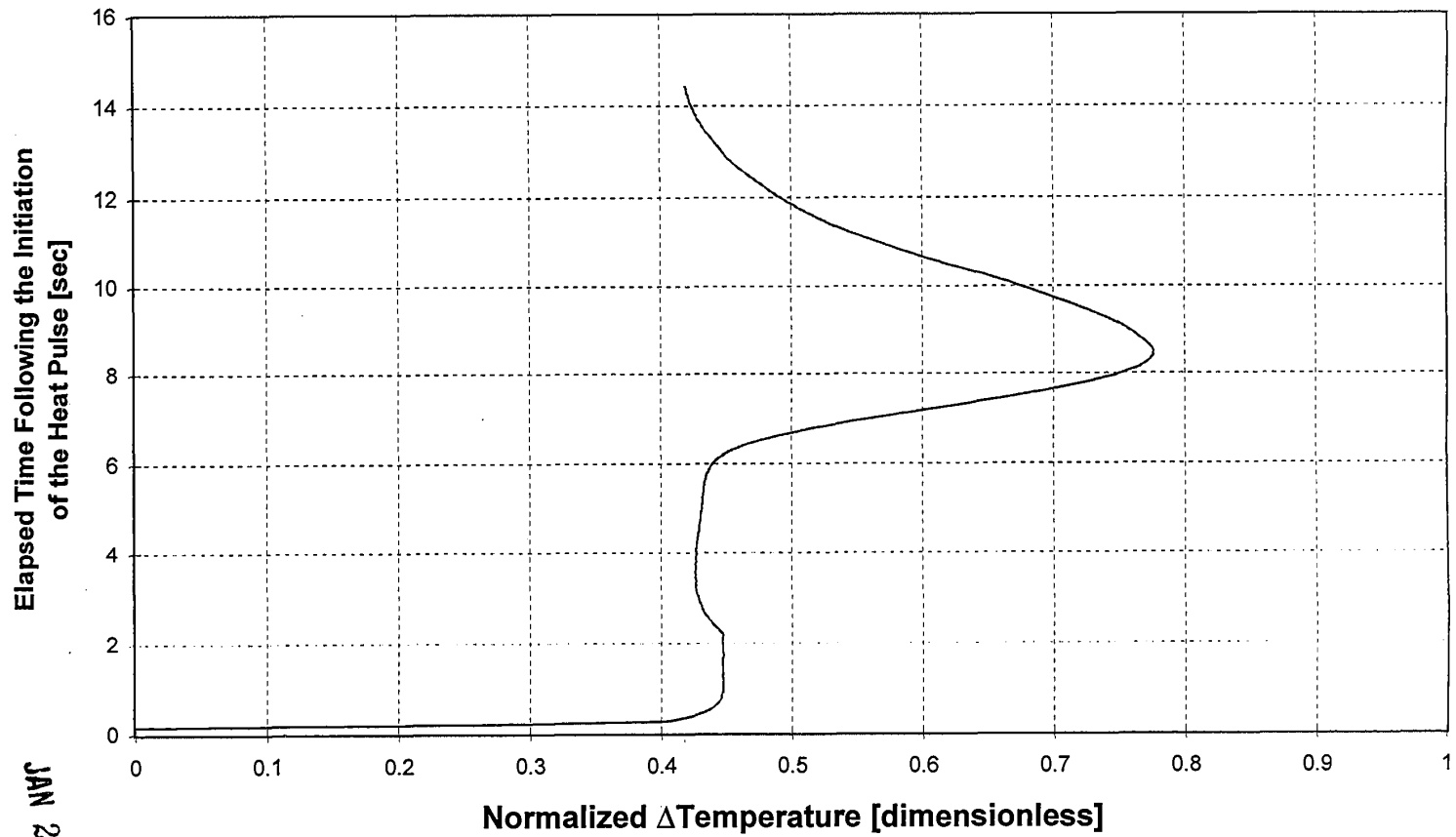
Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE

E-13

MW-7D Under Pumping Conditions 54.9 ft BGS



Elapsed Time Following the Initiation
of the Heat Pulse [sec]

JAN 22 1997

JOB No.:	943-6222	SCALE:	AS SHOWN
DR BY:	MRM	DATE:	01/22/97
CHK BY:	MME	FILE No.:	NJ03-641
REV BY:	FC	DR SUBTITLE:	11

MW-7D HEAT PULSE
WAVEFORM UNDER PUMPING
CONDITIONS - 54.9 ft. BGS

Golder Associates

216 PATERSON PLANK ROAD SITE

FIGURE
E-14

Attachment E-1

Acoustic and Gamma Logging Report

Scope of Work:

COLOG collected cement bond logs (CBLs) utilizing a full waveform sonic logging probe and gamma logs in seven existing steel cased wells at the 216 Paterson Plank Road project, New Jersey for Golder Associates on September 25-27, 1996. The goal of this logging program was to investigate the integrity of the bonding in the steel casing in these wells. The following wells were logged:

<u>Well</u>	<u>Logged TD</u>	<u>Basic Construction</u>
MW-2D	56 ft	4 inch Steel Casing and Screen
MW-2R	88 ft	6 inch Steel Casing and Screen
MW-5D	63 ft	4 inch Steel Casing and Screen
MW-7D	63.5 ft	4 inch Steel Casing and Screen
MW-11D	33 ft	4 inch Steel Casing and Screen
MW-14D	36 ft	4 inch Steel Casing and Screen

Post acquisition, COLOG reprocessed the full waveform sonic data and combined it with the gamma log to make final geophysical logs plotted at a scale of 1 inch to 10 ft with a log header. A reproducible original and 4 blue-line copies of these logs are enclosed with this report. COLOG also generated a one page color summary plot for each well including well design based on information provided by Golder Associates, a Delta-T (transit time), a bond index determined from the CBL, a sonic waveform for the far receiver and the gamma log. Copies of these Summary Plots have been included with this report and are the basis of the CBL log interpretation

Criteria for Cement Bond Log Interpretation:

Acoustic Bond Logs have been traditionally used in the petroleum industry to evaluate the bond between steel casing and the grouted material in the annular space around it. Very simply, unbonded or "free" casing tends to "ring" with a smooth high amplitude acoustic wave response with large displacements in the peak-to-peak amplitude (lower frequency) on the variable density sonic waveform display (VDL). Furthermore, the transit time (Delta-T) for steel casing is very consistent at about 57 micro-seconds/foot (approximately 17,500 fps). Well bonded casing, on the other hand, gives a more "muffled (lower amplitude) response. Since the response of the casing is deadened by the cement or grout adhering to it, response from the grout or the formation behind it is evident as later arrivals and erratic response on the VDL with significant variation in Delta-T.

The muffling effect is further evidenced by the "Bond Index" which is reflecting the amplitude of the first arriving acoustic wave associated with the steel casing. Bond Index is scaled from zero to 1 where 1 indicates no bond and zero suggests a well bonded casing. Note that there are other causes of a high Bond Index than poor cement bond. These include, thin grout sheath, low grout strength (e.g. bentonite grout versus cement) and micro-annulus effects.

The differences between bonded and unbonded casing appear fairly obvious on the Summary Plots. The VDL through the free-casing shows very consistent parallel banding and the Delta-T is consistent at 57 μ S/ft. Bold color variations in the VDL are indicative of the high amplitude "ringing" effect of the acoustic wave traveling through the steel and the Bond Index is near 1. Apparent "free" or unbonded casing is demonstrated in well MW-2R from fluid level to approximately 60 feet with the classic response.

The VDL for bonded casing tends to arrive much later, be more erratic and have a lower amplitude than bonded pipe (more muted blue-green color tones) while the Delta-T is much higher and more variable. The Bond Index for bonded casing is near zero. Apparent well-cemented casing is demonstrated in well MW-7D from approximately 18 to 38 ft with the classic response.

Screened intervals often show parallel banding on the VDL although at a slower Delta-T and later arrival than unbonded casing. Screen is demonstrated in well MW-2D from approximately 46 ft to TD. A bentonite seal (if good integrity) shows a "free" pipe or unbonded casing response (Delta-T is approximately 57 μ S/ft) at a slightly lower amplitude than unbonded casing. A bentonite seal is demonstrated in well MW-2D from approximately 40-43 ft. Sometimes, bentonite seals have a higher gamma value; however, this is highly variable. Note that the minimum bed resolution on the VDL is equal to the transmitter-receiver spacing (COLOG shows a 4 foot spacing on the Summary Plots). Thinner features (less than this spacing) are smeared, or show as a transition on the VDL.

COLOG collected full waveform sonic data with a 45mm Mt. Sopris Instrument Co. (MSI) 2 receiver sonic logging tool through the fluid filled section of these seven wells. The amplitude of the first arriving compressional wave associated with the casing is historically referred to as a cement bond log (CBL). The transmitter-receiver spacing for the far receiver on this tool is 4 feet. Assuming steel casing has a transit time of approximately 57 μ S/ft and a fluid transit time of approximately 200 μ S/ft, the steel arrival occurs at approximately 290-300 micro-seconds on the VDLs.

MW-7D

Fluid level	approximately 4 ft
Bentonite seal	39-43 ft (also has slightly higher gamma)
Screen	46 ft-TD

<u>Good Bond</u>	<u>Fair-Poor Bond</u>	<u>Poor Bond</u>
4-9 ft	9-18 ft	43-46 ft
18-39 ft	39-43 ft	

MW-11D

Fluid level	approximately 3 ft
Bentonite seal	19- 22 ft (also has slightly higher gamma)
Screen	23 ft -TD

<u>Good Bond</u>	<u>Fair-Poor Bond</u>	<u>Poor Bond</u>
3-8 ft	8-10 ft	19-23 ft
10-19 ft		

MW-14D

Fluid level	approximately 2 ft
Filter Pack	possibly 28-30 ft
Screen	30 ft -TD

<u>Good Bond</u>	<u>Fair-Poor Bond</u>	<u>Poor Bond</u>
2-4 ft	6-8 ft	4-6 ft
8-11 ft	11-13 ft	
13-28 ft	28-30 ft	

MW-18D

Fluid level	approximately 7 ft
Filter Pack	possibly 55-60 ft?
Screen	60 ft-TD

<u>Good Bond</u>	<u>Fair-Poor Bond</u>	<u>Poor Bond</u>
7-9 ft	9-15 ft	22-29 ft
15-22 ft		55-60 ft
29-55 ft		

CBL Interpretation Summaries:

MW-2D

Fluid level	approximately 8 ft
Bentonite seal	?37-41 ft (also has slightly higher gamma)
Screen	47 ft-TD

<u>Good Bond</u>	<u>Fair-Poor Bond</u>	<u>Poor Bond</u>
FL-10 ft	12-20 ft	10-12 ft
20-28 ft	31-34 ft	28-31 ft
	41-44 ft	34-41 ft
		44-47 ft

Well MW-2R

Fluid level	approximately 6 ft
Bentonite seal	not indicated
Screen	not indicated
Bottom of Casing	approximately 60 ft

<u>Good Bond</u>	<u>Fair-Poor Bond</u>	<u>Poor Bond</u>
FL-9 ft	9-12 ft	12-22 ft
	22-30 ft	30-60 ft

MW-5D

Fluid level	approximately 2 ft
Bentonite seal	43-47 ft (also has slightly higher gamma)
Screen	47 ft - TD

<u>Good Bond</u>	<u>Fair-Poor Bond</u>	<u>Poor Bond</u>
FL-9 ft	12-22 ft	9-12 ft
22-43 ft		

Limitations:

COLOG's logging was performed in accordance with generally accepted industry practices involving similar studies at the same time and in the same geographical area. COLOG has observed that degree of care and skill generally exercised by others under similar circumstances and conditions. Interpretations of logs or interpretation of test or other data, and any recommendation or hydrogeologic description based upon such interpretations, are opinions based upon inferences from measurements, empirical relationships and assumptions. These inferences and assumptions require engineering judgment, and therefore are not scientific certainties. As such, other professional engineers or analysts may differ as to their interpretation. Accordingly, COLOG cannot and does not warrant the accuracy, correctness or completeness of any such interpretation, recommendation or hydrogeologic description.

All technical data, evaluations, analysis, reports, and other work products are instruments of COLOG's professional services intended for one time use on this project. Any reuse of work product by Client for other than the purpose for which they were originally intended will be at Client's sole risk and without liability to COLOG. COLOG makes no warranties, either express or implied. Under no circumstances shall COLOG or its employees be liable for consequential damages.



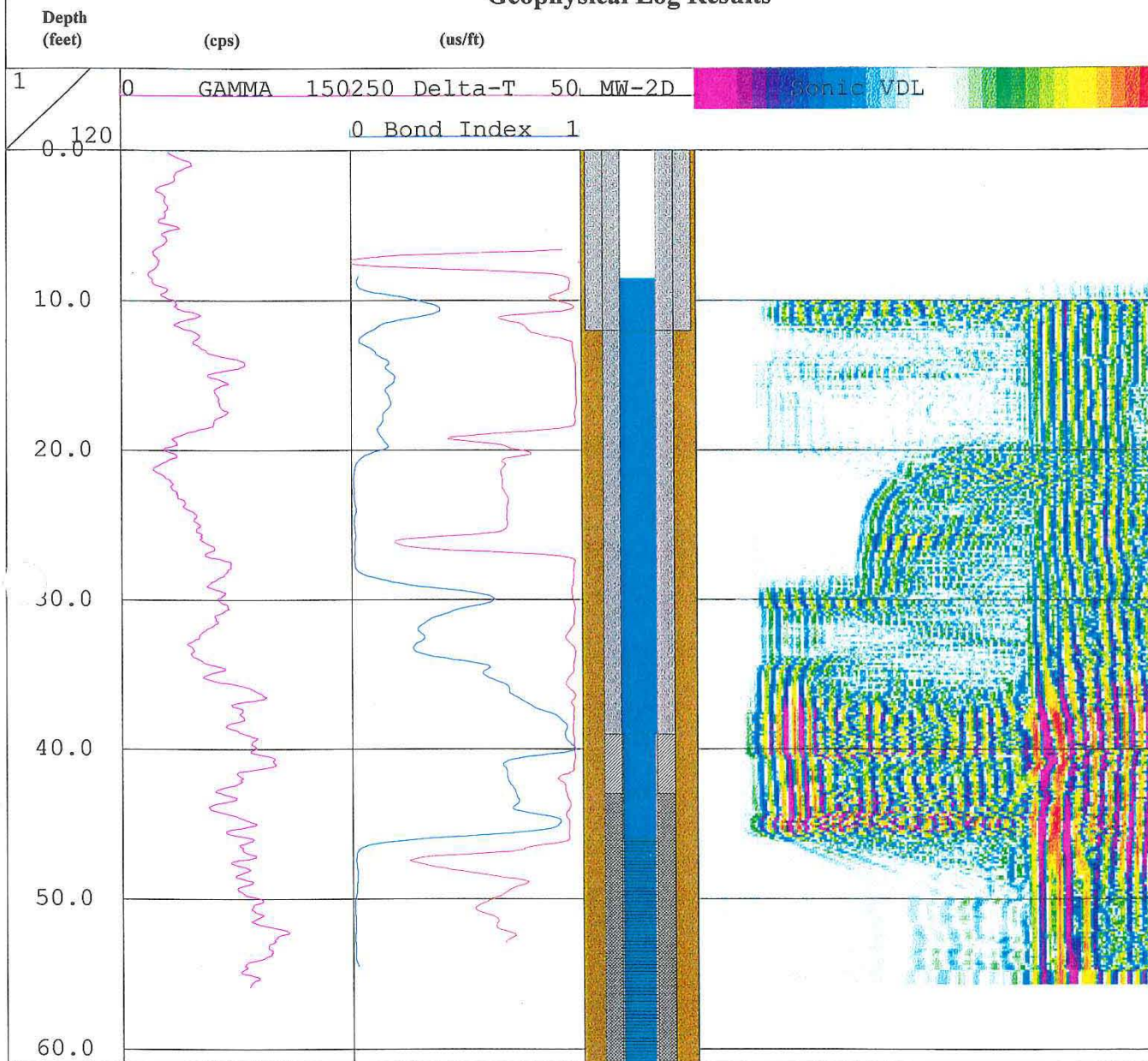
COMPANY: Golder Associates

PROJECT: CARLSTADT

DATE: October 8, 1996

WELL: MW-2D REV: 1.0 BY: NLH

Geophysical Log Results





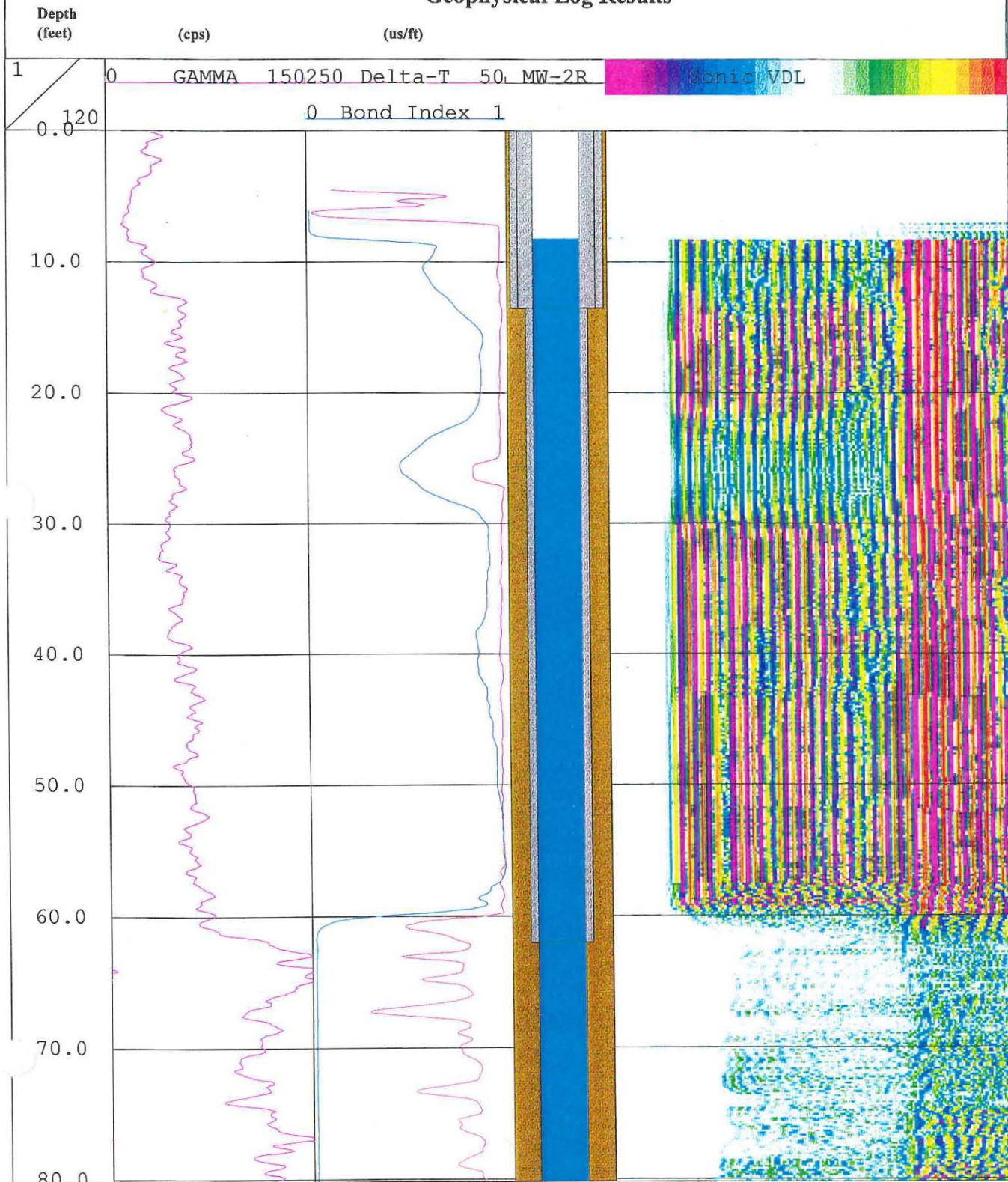
COMPANY: Golder Associates

PROJECT: CARLSTADT

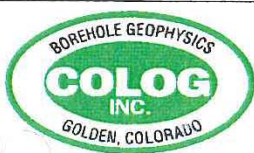
DATE: October 8, 1996

WELL: MW-2R REV: 1.0 BY: NLH

Geophysical Log Results



R2-0000521



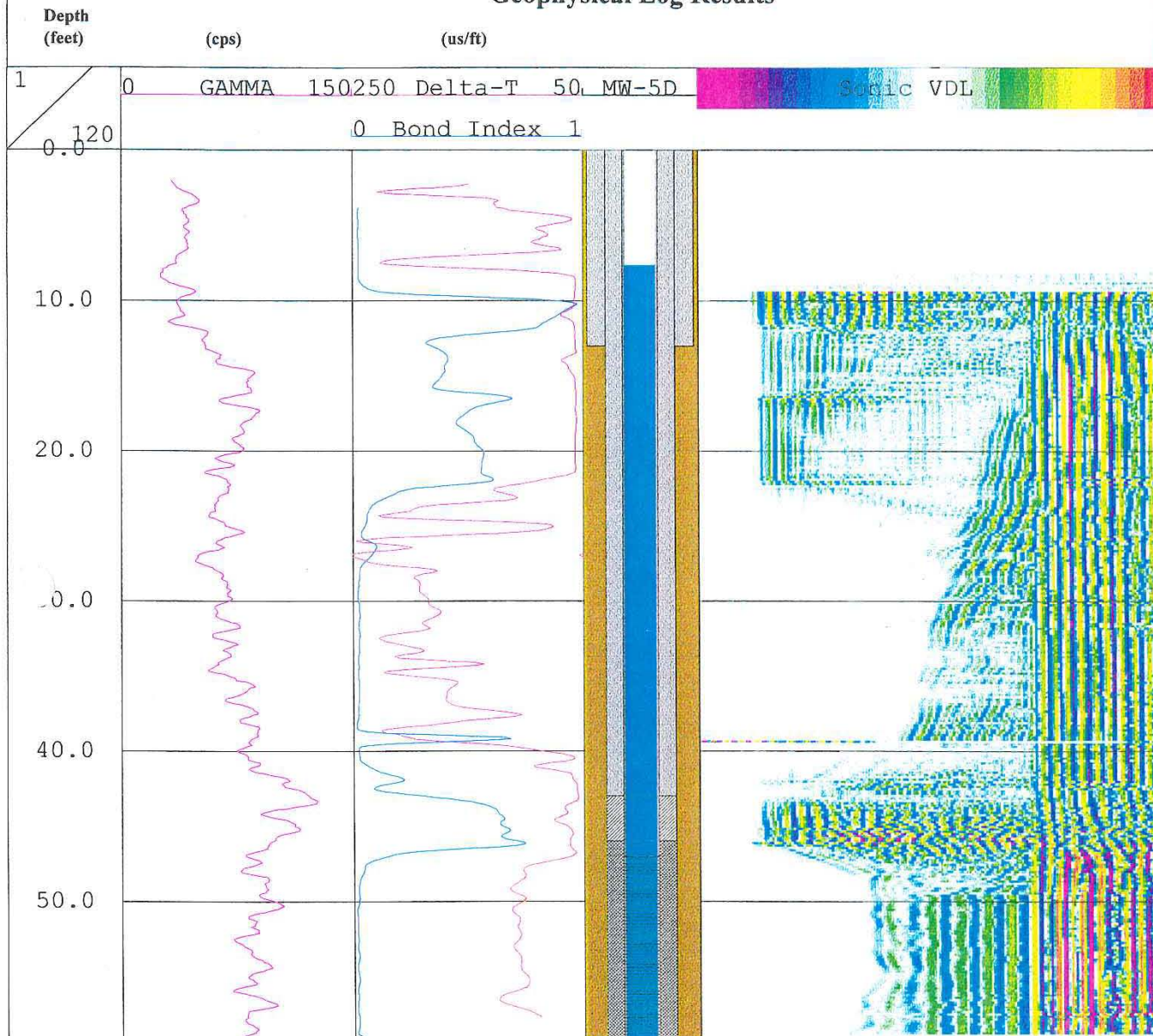
COMPANY: Golder Associates

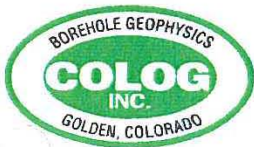
PROJECT: CARLSTADT

DATE: October 8, 1996

WELL: MW-5D REV: 1.0 BY: NLH

Geophysical Log Results





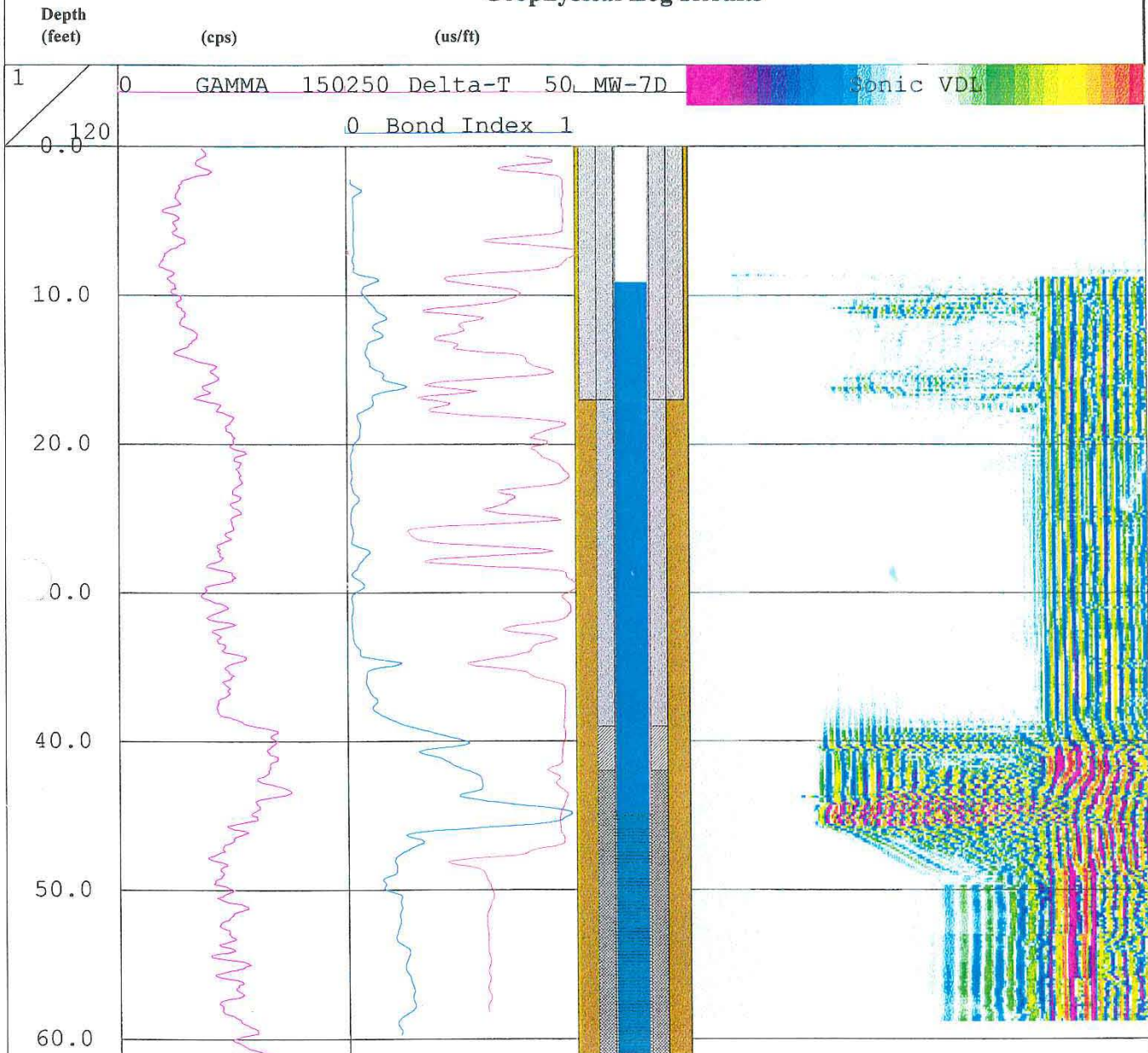
COMPANY: Golder Associates

PROJECT: CARLSTADT

DATE: October 8, 1996

WELL: MW-7D REV: 1.0 BY: NLH

Geophysical Log Results





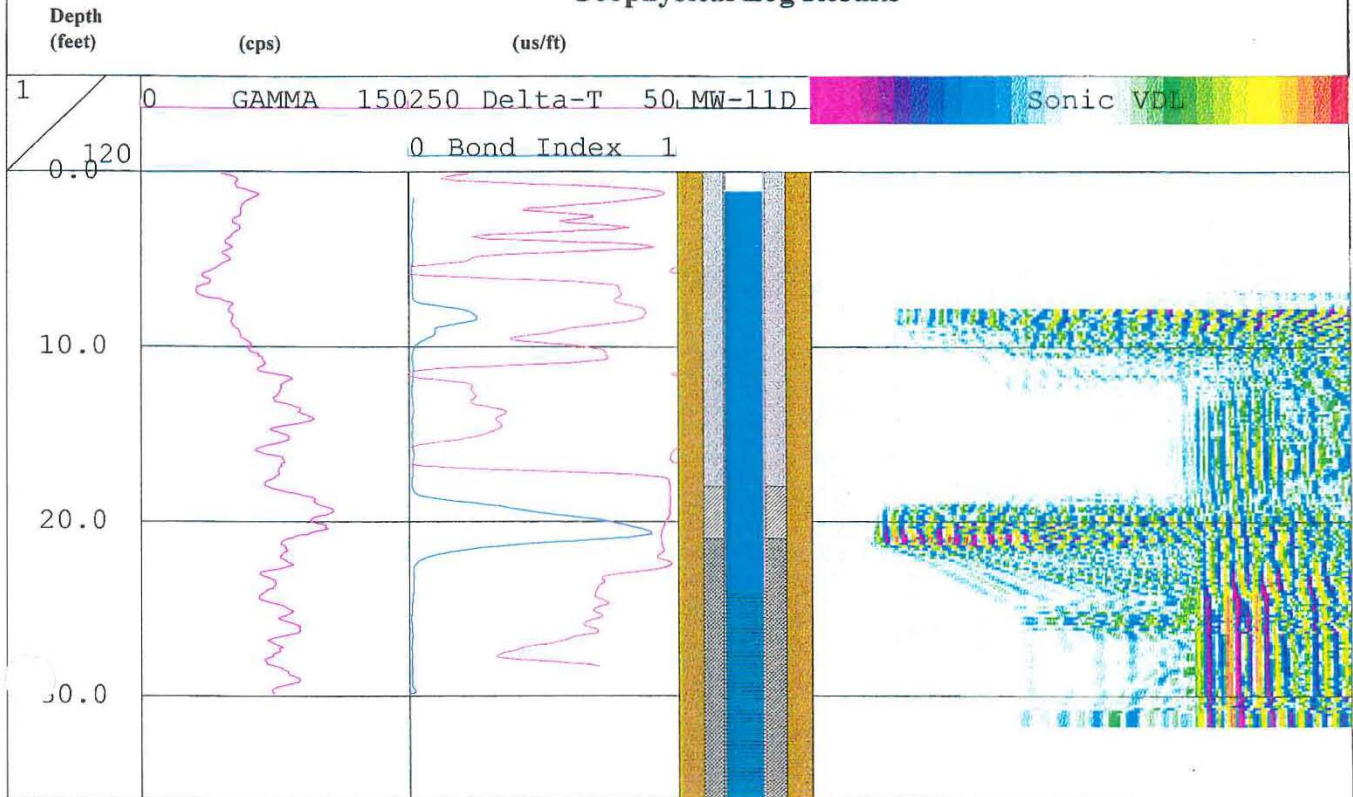
COMPANY: Golder Associates

PROJECT: CARLSTADT

DATE: October 8, 1996

WELL: MW-11D REV: 1.0 BY: NLH

Geophysical Log Results





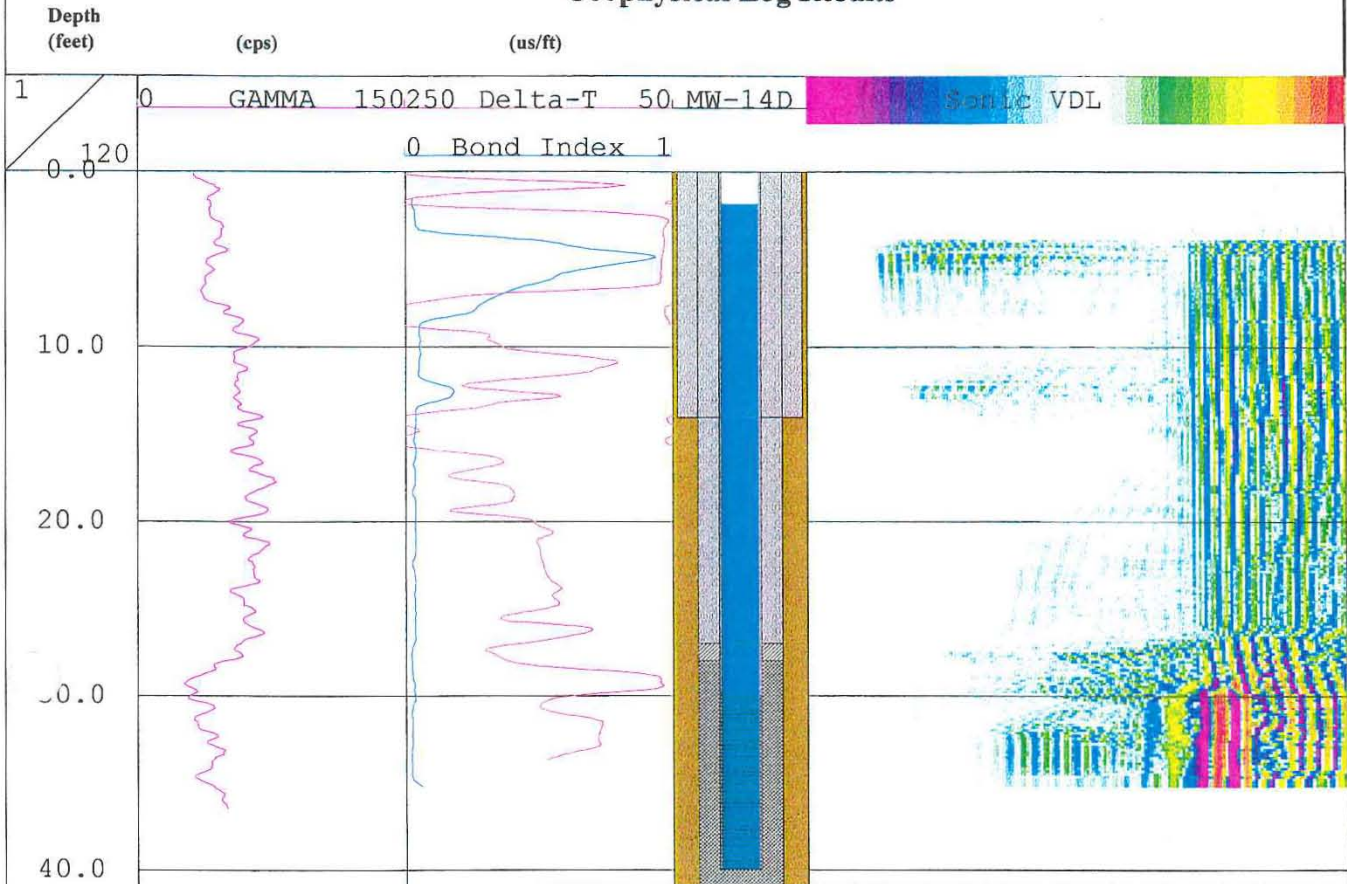
COMPANY: Golder Associates

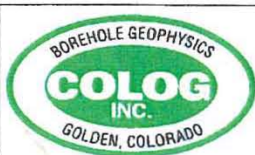
PROJECT: CARLSTADT

DATE: October 8, 1996

WELL: MW-14D REV: 1.0 BY: NLH

Geophysical Log Results





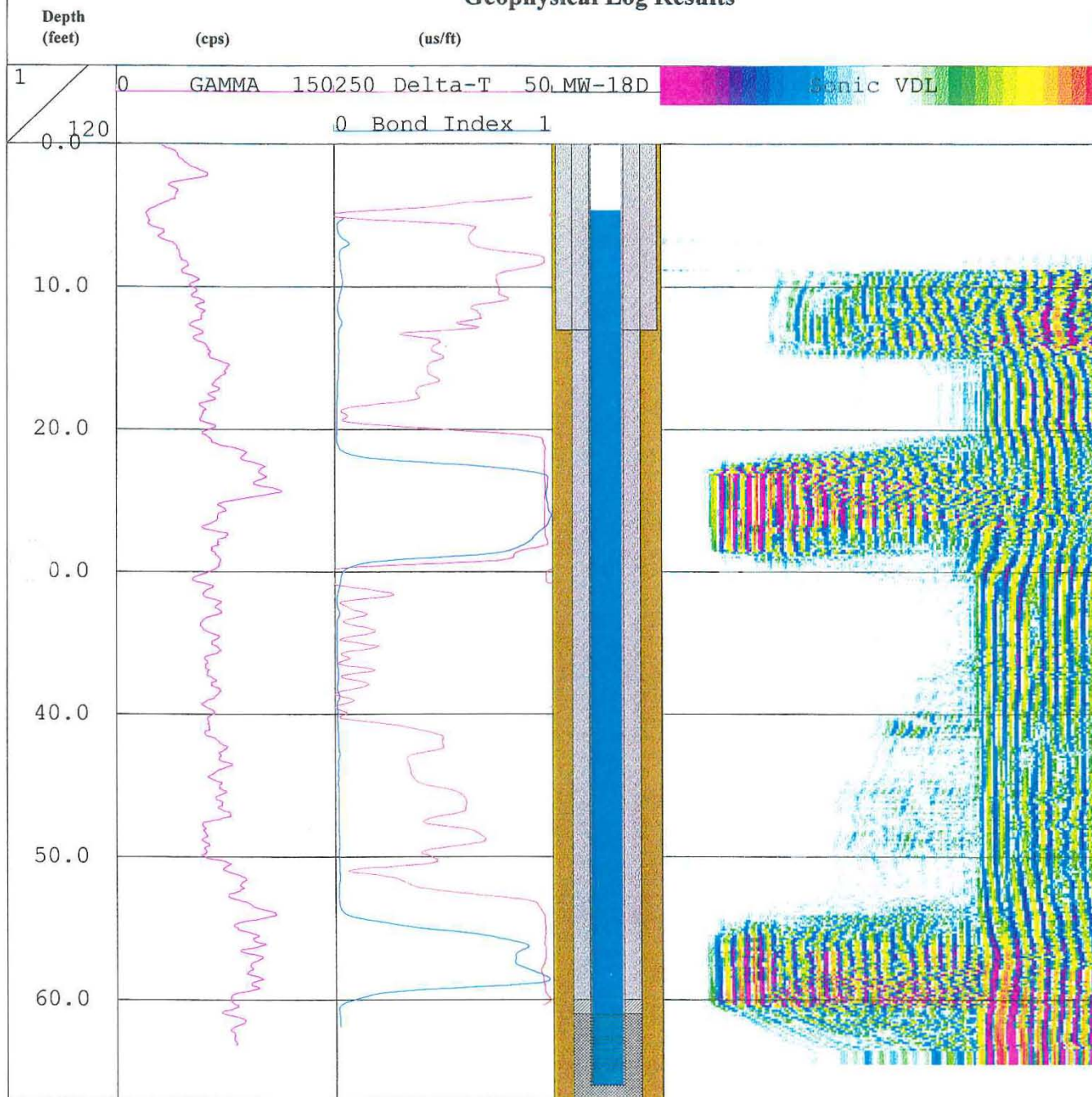
COMPANY: Golder Associates

PROJECT: CARLSTADT

DATE: October 8, 1996

WELL: MW-18D REV: 1.0 BY: NLH

Geophysical Log Results



APPENDIX F

Summary of Low Flow Purging Information

SUMMARY OF PURGING INFORMATION
 MONITORING WELL MW-02D
 SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
 216 PATERSON PLANK ROAD SITE
 CARLSTADT, NEW JERSEY

Sampling Date: September 17, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (oC)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
15:38	00:00	BEGIN PURGING						12.00		
15:39	00:01	14.9	8.23	3.29	30.3	10.0	-0.80		0.3	300
15:42	00:04	15.0	8.20	3.28	20.8	0.0	-0.85		0.6	100
15:45	00:07	15.3	8.08	3.30	18.6	0.0	-0.91		0.9	100
15:47	00:09	15.6	8.04	3.24	31.7	0.0	-0.85		1.5	200
15:50	00:12	15.7	8.03	3.16	32.8	0.0	-0.78		2.5	330
15:53	00:15	15.8	8.13	3.08	58.3	0.0	-0.78		3.5	330
15:56	00:18	15.8	8.16	2.99	96.8	0.0	-0.77		4.5	330
15:59	00:21	15.8	8.16	2.96	115.0	0.0	-0.80		5.5	330
16:02	00:24	15.8	8.18	2.94	118.0	0.0	-0.84	14.00	6.5	330
16:15	00:37	BEGIN SAMPLING								

SUMMARY OF PURGING INFORMATION
 MONITORING WELL MW-02R
 SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
 216 PATERSON PLANK ROAD SITE
 CARLSTADT, NEW JERSEY

Sampling Date: September 18, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
08:57	00:00	BEGIN PURGING						11.20		
08:58	00:01	16.0	8.35	1.90	93.0	0.0	3.85		0.2	200
9:07	00:10	14.9	10.59	2.23	11.7	0.0	0.80		2.0	200
9:11	00:14	15.0	10.60	2.27	-4.1	0.0	0.55		3.5	
9:14	00:17	14.9	10.59	2.29	-3.3	0.0	0.71		4.2	
9:19	00:22	14.9	10.60	2.30	-12.0	0.0	0.43		5.2	
9:22	00:25	14.9	10.61	2.30	-13.0	0.0	0.38	11.95	5.8	
9:25	00:28	14.9	10.62	2.30	-16.3	0.0	0.37		6.4	200
9:29	00:32	14.9	10.63	2.31	-22.2	0.0	0.37	11.95	7.2	200
9:45	00:48	BEGIN SAMPLING						11.94		

January 1997

943-6222

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-05D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 18, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
08:57	00:00	BEGIN PURGING						10.50		
09:06	00:09	16.0	7.19	1.64	98.5	0.0	3.28	11.00	1.4	160
9:11	00:14	15.9	7.55	1.70	66.8	0.0	2.82		2.1	155
9:16	00:19	16.0	7.63	1.69	61.2	0.0	2.70		3.0	180
9:20	00:23	BEGIN SAMPLING								

January 1997

3-6222

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-07D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 18, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
13:07	00:00	BEGIN PURGING						11.03		
13:15	00:08	17.4	7.74	0.806	94.0	0.0	4.14		0.80	100
13:24	00:17	17.2	8.13	0.796	70.3	0.0	3.39	11.45	2.15	150
13:30	00:23	17.2	8.20	0.793	64.8	0.0	2.85		3.05	150
13:36	00:29	17.2	8.24	0.793	61.6	0.0	2.94	11.70	3.95	150
13:40	00:33	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-08D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 18, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
14:17	00:00	BEGIN PURGING						4.40		
14:21	00:04	16.5	8.07	2.28	41.5	590.0	-0.59	5.40	0.8	200
14:25	00:08	16.7	8.09	2.28	33.0	532.0	-0.58	5.40	1.5	175
14:30	00:13	16.8	8.08	2.28	23.6	503.0	-0.57	5.40	2.2	140
14:35	00:18	18.3	8.11	2.32	88.3	511.0	0.22		2.5	60
14:42	00:25	18.3	8.09	2.32	54.4	509.0	-0.07	5.40	2.8	45
14:49	00:32	18.5	8.09	2.31	20.3	509.0	0.02	5.65	3.2	
14:55	00:38	17.9	8.14	2.32	-14.3	>999	-0.65		3.6	
15:09	00:52	17.9	8.11	2.31	7.4	>999	0.70		4.6	70
15:14	00:57	17.9	8.12	2.32	-10.4	>999	0.77	5.95	5.3	140
15:20	01:03	17.9	8.17	2.31	-30.3	>999	0.59	5.96	6.2	150
15:25	01:08	17.8	8.18	2.30	-35.2	>999	0.45	5.97	6.8	120
15:30	01:13	17.8	8.18	2.30	-47.9	>999	0.23		7.4	120
15:35	01:18	17.8	8.18	2.30	-60.3	>999	0.18		8.1	140
15:40	01:23	17.8	8.18	2.30	-60.0	900.0	0.14	5.99	8.7	120
15:45	01:28	17.8	8.18	2.30	-60.0	839.0	0.12	5.99	9.5	160
15:50	01:33	17.8	8.18	2.30	-57.2	783.0	0.03	5.99	10.1	120
15:55	01:38	17.7	8.19	2.30	-57.2	753.0	0.04	5.99	10.7	120
16:00	01:43	17.7	8.19	2.30	-52.1	717.0	-0.07		11.3	120
16:03	01:46	17.7	8.19	2.29	-60.4	608.0	-0.21		11.7	130
16:10	01:53	17.7	8.19	2.29	-72.3	622.0	-0.21	5.96	12.9	170
16:15	01:58	17.7	8.19	2.27	-73.9	542.0	-0.31	5.96	13.8	160
16:20	02:03	17.7	8.19	2.26	-77.8	507.0	-0.33		14.7	180
16:25	02:08	17.7	8.19	2.27	-69.7	527.0	-0.34		16.4	300
16:35	02:18	17.6	8.19	2.27	-71.7	429.0	-0.40	5.96	19.9	350
16:45	02:28	17.5	8.20	2.25	-70.4	393.0	-0.54		23.4	350
16:50	02:33	17.5	8.20	2.23	-74.1	353.0	-0.51		25.1	340
17:00	02:43	17.5	8.20	2.22	-73.1	389.0	-0.57	5.99	28.6	300
17:05	02:48	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-08R
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 19, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
09:05	00:00	BEGIN SAMPLING						5.11		
09:15	00:10	16.9	10.35	2.67	-80.2	0.0	2.45	5.55	1.8	180
9:18	00:13	17.0	10.63	2.66	-88.8	14.0	2.01	5.56	2.3	180
9:25	00:20	17.0	10.75	2.67	-89.7	19.0	1.59	5.56	3.5	180
9:30	00:25	17.1	10.75	2.66	-83.0	13.0	1.46	5.65	4.4	120
9:35	00:30	17.1	10.75	2.67	-76.0	7.0	1.36	5.60	4.8	80
9:40	00:35	17.1	10.74	2.68	-77.1	8.0	1.41	5.60	5.2	80
9:43	00:38	17.1	10.73	2.67	-76.2	7.0	1.46		5.7	180
9:45	00:40	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-10D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 20, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
8:41	00:00	BEGIN PURGING						7.05		
8:45	00:04	17.6	11.08	1.01	-7.5	26.0	3.21		0.6	160
9:00	00:19	17.2	11.09	1.09	1.0	26.0	2.81	8.11	1.2	160
9:05	00:24	17.2	11.09	1.10	-0.8	18.0	3.14	8.70	2.3	220
9:10	00:29	17.6	11.08	1.11	0.1	13.0	3.10	9.38	3.3	190
9:18	00:37	17.5	11.08	1.11	1.6	11.0	3.13	10.30	5.3	250
9:26	00:45	17.9	11.07	1.10	3.7	4.0	2.65	11.10	8.6	400
9:36	00:55	17.8	11.08	1.11	6.0	0.0	2.73	12.30	12.6	400
9:41	01:00	18.0	11.07	1.10	3.0	0.0	2.68	12.52	14.6	400
9:45	01:04	17.9	11.08	1.11	3.5	0.0	2.97		16.2	400
9:50	01:09	18.1	11.07	1.11	2.3	0.0	2.62	13.48	18.2	400
10:00	01:19	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-10R
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 20, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
11:50	00:00	BEGIN PURGING						7.15		
11:55	00:05	19.7	9.18	0.589		46.0	1.67	7.25	0.3	200
11:59	00:09	18.6	9.66	0.619	22.6	227.0	0.91	7.35	1.4	275
12:04	00:14	17.7	9.91	0.643	4.0	564.0	0.04	7.37	2.9	300
12:09	00:19	17.7	9.91	0.647	-8.2	409.0	-0.23	7.38	4.4	300
12:16	00:26	17.7	9.91	0.644	-14.8	343.0	-0.25	7.39	6.5	300
12:21	00:31	17.7	9.88	0.650	-21.5	327.0	-0.21	7.39	8.0	300
12:26	00:36	17.6	9.90	0.652	-25.1	300.0	-0.12	7.40	9.5	300
12:31	00:41	17.6	9.90	0.653	-28.1	277.0	-0.21	7.40	11.0	300
12:34	00:44	17.6	9.91	0.654	-32.6	270.0	-0.26	7.40	12.5	300
12:38	00:48	17.6	9.93	0.655	-35.4	248.0	-0.37	7.40	13.7	300
12:42	00:52	17.6	9.94	0.657	-36.3	178.0	-0.31	7.40	14.9	300
12:47	00:57	17.6	9.95	0.657	-37.3	148.0	-0.38	7.40	16.3	280
12:53	01:03	17.6	9.98	0.657	-39.8	150.0	-0.43	7.40	18.1	300
13:00	01:10	17.6	10.01	0.656	-42.2	92.0	-0.45	7.40	20.2	300
13:04	01:14	17.6	10.02	0.656	-45.2	77.0	-0.48	7.40	21.4	300
13:08	01:18	17.6	10.03	0.657	-47.0	63.0	-0.48	7.40	22.6	300
13:12	01:22	17.7	10.04	0.656	-49.7	64.0	-0.48	7.40	23.8	300
13:16	01:26	17.7	10.06	0.656	-51.8	60.0	-0.48	7.40	25.0	300
13:18	01:28	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-11D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 24, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
10:26	00:00	BEGIN SAMPLING						5.25		
10:28	00:02	17.0	8.96	0.813		50.0	1.30	5.40	0.3	150
10:33	00:07	16.4	9.10	1.120	-0.1	42.0	0.38	5.52	1.0	200
10:38	00:12	16.6	9.30	1.160	-9.6	58.0	-0.01	5.55	1.5	100
10:42	00:16	16.6	9.34	1.180	-11.5	66.0	-0.10	5.50	2.2	175
10:46	00:20	16.6	9.34	1.190	-13.2	84.0	-0.09	5.56	2.8	150
10:51	00:25	16.6	9.35	1.200	-15.5	88.0	-0.04	5.56	3.5	150
10:56	00:30	16.6	9.36	1.210	-23.5	85.0	0.04	5.57	4.3	150
11:02	00:36	16.7	9.35	1.210	-29.1	75.0	0.01	5.57	5.2	150
11:09	00:43	16.8	9.34	1.210	-37.4	66.0	-0.05	5.58	5.8	100
11:14	00:48	16.8	9.34	1.210	-38.8	65.0	-0.10	5.58	6.4	120
11:19	00:53	16.9	9.33	1.210	-38.9	55.0	-0.22	5.59	7.0	120
11:24	00:58	16.9	9.33	1.210	-39.1	49.0	-0.24	5.59	7.6	120
11:29	01:03	17.0	9.33	1.210	-40.9	49.0	-0.29	5.58	8.4	160
11:32	01:06	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-11R
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 24, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
10:03	00:00	BEGIN PURGING						6.00		
10:07	00:04	15.7	11.24	1.33	-3.6	2.0	2.07	6.06	1.1	280
10:12	00:09	15.6	11.26	1.40	-77.7	8.0	1.86	6.07	2.5	280
10:17	00:14	15.7	11.24	1.37	-97.9	7.0	1.54	6.09	3.9	280
10:22	00:19	16.2	11.17	1.30	-111.7	7.0	1.36	6.10	5.9	400
10:27	00:24	16.3	11.12	1.24	-121.7	4.0	1.31	6.10	8.4	500
10:32	00:29	16.4	11.08	1.20	-104.9	1.0	1.23	6.11	10.8	480
10:37	00:34	16.4	11.06	1.17	-124.3	0.0	1.25	6.12	13.2	480
10:42	00:39	16.5	11.05	1.16	-131.4	0.0	1.21	6.12	15.6	480
10:45	00:42	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-12D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 23, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
11:12	00:00	BEGIN PURGING						5.62		
11:15	00:03	10.6	6.68	1.16		65.0	1.43	5.85	0.40	130
11:19	00:07	16.1	6.94	1.66	-118.2	68.0	1.17	5.93	0.80	100
11:24	00:12	16.1	6.93	1.94	-115.0	62.0	0.59	5.90	1.80	200
11:28	00:16	16.1	6.94	1.98	-115.3	59.0	0.43	5.90	2.80	250
11:32	00:20	16.1	6.95	2.00	-118.5	58.0	0.44	5.90	3.80	250
11:36	00:24	16.1	6.95	2.01	-119.6	59.0	0.44	5.90	4.60	200
11:41	00:29	16.1	6.96	2.02	-121.2	59.0	0.44	5.90	5.60	200
11:42	00:30	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL RMW-13D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 23, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
10:54	00:00	BEGIN PURGING						4.51		
10:55	00:01	16.9	10.73	1.49	88.9	8.0	2.70	4.58	0.54	540
11:00	00:06	17.0	10.27	1.44	95.8	10.0	1.59	4.56	2.90	470
11:05	00:11	17.3	9.99	1.43	102.1	6.0	1.36	4.50	4.50	320
11:10	00:16	17.7	9.80	1.42	106.5	5.0	1.34	4.50	5.70	240
11:15	00:21	17.7	9.73	1.42	101.7	4.0	1.28	4.50	6.90	240
11:20	00:26	17.8	9.70	1.41	97.1	4.0	1.26	4.50	8.10	240
11:25	00:31	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-14D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 23, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
8:14	00:00	BEGIN PURGING						1.13		
8:15	00:01	16.6	9.94	2.62	-55.5	21.0	2.60	1.84	0.24	240
8:20	00:06	16.7	10.55	1.91	-72.1	55.0	2.36	1.91	1.00	160
8:25	00:11	17.3	10.82	1.74	-66.9	65.0	1.71	1.97	1.40	80
8:30	00:16	17.6	10.97	1.69	-65.1	60.0	1.34	2.22	1.80	80
8:35	00:21	17.9	11.07	1.65	-68.0	47.0	1.68	2.31	2.20	80
8:40	00:26	18.1	11.10	1.64	-66.4	30.0	1.56	2.33	2.60	80
8:45	00:31	18.2	11.12	1.63	-65.0	22.0	1.57	2.35	3.00	80
8:50	00:36	18.3	11.12	1.62	-65.3	21.0	1.47	2.36	3.40	80
8:55	00:41	18.7	11.13	1.61	-68.3	16.0	1.49	2.47	3.80	80
9:00	00:46	18.6	11.14	1.62	-62.9	16.0	1.38	2.51	4.20	80
9:05	00:51	18.7	11.19	1.61	-70.6	9.0	1.53	2.53	4.60	80
9:15	01:01	18.8	11.18	1.61	-79.2	9.0	1.41	2.65	5.00	80
9:20	01:06	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-14R
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 23, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
8:22	00:00	BEGIN PURGING						1.68		
8:24	00:02	15.4	9.94	0.745	-92.8	61.0	-0.27	2.98	2.4	1200
8:27	00:05	15.5	10.22	0.898	-92.1	63.0	-0.66	3.19	4.3	630
8:30	00:08	16.1	10.30	0.962	-90.4	57.0	-0.75		5.9	530
8:33	00:11	16.4	10.31	0.990	-89.3	64.0	-0.75	3.22	6.9	330
8:36	00:14	16.6	10.31	1.050	-85.5	62.0	-0.72	3.25	7.9	330
8:39	00:17	16.7	10.29	1.060	-89.3	57.0	-0.74	3.26	8.9	330
8:42	00:20	16.8	10.27	1.080	-93.3	60.0	-0.71	3.27	10.0	370
8:45	00:23	16.9	10.24	1.070	-98.2	59.0	-0.71	3.27	11.0	330
8:48	00:26	17.0	10.20	1.080	-102.4	60.0	-0.69	3.28	12.0	330
8:51	00:29	17.1	10.13	1.080	-105.9	62.0	-0.69		12.9	300
8:54	00:32	17.1	10.02	1.080	-115.1	63.0	-0.72	3.28	13.8	300
8:58	00:36	17.1	10.03	1.080	-119.8	60.0	-0.71	3.28	14.7	225
9:01	00:39	17.1	10.03	1.070	-124.3	57.0	-0.69	3.29	15.6	300
9:05	00:43	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-15D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 24, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
8:00	00:00	BEGIN PURGING						9.15		
8:05	00:05	16.0	11.09	1.38		1.0	1.23	9.30	0.4	80
8:10	00:10	15.8	11.22	1.38		0.0	0.86	9.36	0.9	100
8:15	00:15	15.6	11.26	1.39	-115.2	0.0	0.66	9.42	1.4	100
8:20	00:20	15.4	11.31	1.40	-120.4	0.0	0.77	9.50	1.8	80
8:25	00:25	15.3	11.36	1.41	-125.1	1.0	0.72	9.51	2.8	200
8:30	00:30	15.2	11.41	1.41	-121.6	11.0	0.65	9.51	3.8	200
8:35	00:35	15.1	11.47	1.41	-119.4	20.0	0.70	9.53	4.8	200
8:40	00:40	15.9	11.61	1.63	-117.4	6.0	-0.05		5.8	200
8:45	00:45	15.9	11.63	1.60	-115.6	11.0	-0.06	9.54	6.5	140
8:50	00:50	15.8	11.64	1.62	-116.0	8.0	-0.12	9.54	7.3	160
8:55	00:55	15.8	11.65	1.63	-117.5	8.0	-0.10	9.54	8.0	140
9:00	01:00	15.7	11.67	1.64	-118.1	8.0	-0.09	9.55	9.8	160
9:05	01:05	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-16D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 23, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
13:44	00:00	BEGIN PURGING						6.43		
13:45	00:01	16.0	11.76	2.97	31.9	27.0	2.20	6.54	0.2	220
13:50	00:06	16.0	11.79	3.18	18.0	26.0	1.86	6.56	1.3	220
13:55	00:11	16.1	11.79	3.21	3.2	22.0	1.79	6.56	2.5	230
14:00	00:16	16.2	11.78	3.19	-29.4	21.0	1.61	6.57	3.7	240
14:05	00:21	16.4	11.76	3.11	-46.8	12.0	1.49	6.59	4.9	240
14:10	00:26	16.5	11.73	3.02	-57.5	8.0	1.44	6.59	6.1	240
14:15	00:31	16.5	11.70	2.88	-61.8	5.0	1.58	6.57	7.3	240
14:20	00:36	16.5	11.69	2.83	-65.2	3.0	1.48	6.57	8.5	240
14:25	00:41	16.5	11.67	2.68	-69.7	3.0	1.47	6.57	9.7	240
14:30	00:46	16.4	11.65	2.59	-72.9	1.0	1.42	6.60	10.9	240
14:35	00:51	16.3	11.63	2.50	-68.6	1.0	1.32	6.61	12.1	240
14:45	01:01	BEGIN SAMPLING								

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-17D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 19, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
9:11	00:00	BEGIN PURGING						4.16		
9:12	00:01	17.6	8.97	2.44	88.3	-8.0	0.59		0.3	300
9:17	00:06	17.7	7.76	2.60		169.0	0.27	4.40	1.8	300
9:24	00:13	16.8	7.27	2.79	-140.6	686.0	-0.29	4.62	3.0	170
9:30	00:19	16.8	7.29	2.79	-156.9		-0.63	4.69	4.0	170
9:43	00:32	17.1	7.13	2.85	-158.8	386.0	-0.32	4.70	6.2	170
9:52	00:41	17.1	7.15	2.85	-165.6	206.0	-0.44		11.5	590
9:57	00:46	17.0	7.14	2.85	-165.5	165.0	-0.56		13.0	300
10:04	00:53	17.1	7.12	2.85	-164.6	131.0	-0.71	4.71	15.2	315
10:15	01:04	17.1	7.11	2.86	-162.2	134.0	-0.74	4.72	18.5	300
10:19	01:08	17.1	7.11	2.86	-161.8	131.0	-0.79	4.72	19.7	300
10:21	01:10	BEGIN SAMPLING								

January 1997

943-6222

**SUMMARY OF PURGING INFORMATION
MONITORING WELL MW-18D
SEPTEMBER 1996 GROUNDWATER SAMPLING EVENT
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY**

Sampling Date: September 19, 1996

Time (HH:MM)	Elapsed Time (HH:MM)	Temperature (°C)	pH (std)	Specific Conductance (mS)	eH (mv)	Turbidity (NTU)	Dissolved Oxygen (mg/l)	Depth To Water (ft. btc)	Volume Purged (Liters)	Approximate Purge Rate (ml/min)
11:44	00:00	BEGIN PURGING						4.13		
11:45	00:01	16.8	7.35	2.79	52.7	237.0	2.04	4.69	0.3	300
11:50	00:06	16.2	7.54	2.85	20.4	>999	1.24	4.77	2.1	350
12:00	00:16	16.6	7.40	2.89	-8.2	>999	1.10	4.65	4.1	400
12:08	00:24	17.1	7.36	2.89	-13.3	550.0	1.08	4.54	6.8	340
12:25	00:41	17.7	7.32	2.47	53.5	480.0	2.43	4.61	11.2	260
12:35	00:51	17.0	7.27	2.84	17.7	78.0	1.26	4.61	13.6	260
12:45	01:01	16.9	7.27	2.88	14.0	38.0	1.12	4.61	16.0	240
12:55	01:11	16.9	7.26	2.89	15.4	21.0	1.07	4.61	18.4	240
13:00	01:16	16.9	7.26	2.89	14.3	17.0	1.07	4.60	20.8	240
13:05	01:21	16.9	7.26	2.89	14.1	17.0	1.06	4.63	23.2	240
13:15	01:31	BEGIN SAMPLING								

APPENDIX G
Chain of Custody Forms

COMPUCHEM
ENVIRONMENTAL
CORPORATION

3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

№ 10031

Ship to: Compu Chem	Project Name: Carlstadt	Field Point-of-Contact: Lecc Hendel
Carrier: Fed Express	Airbill No.: 753036	Sampler Name: Mike Zarenski / J. Hendel
Sampler Signature: <i>[Signature]</i>		Telephone No.: 609-273-1110
Project-specific (PS) or Batch (B) QC: PS		Sampling for project complete? Y or (N) (See Note 1)

Box #1: Matrix	Box #2: Preservative	Box #3: Filtered/Unfiltered	Box #4: Method	Box #5: Expect Conc.	Box #6: No. of Bottles	Box #7: Use for Lab QC (MS or DUP)	Box #8: Organics Analysis	Box #9: Inorganics	Box #10: Other
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Sample ID (Organics: 9 characters max; Inorganics: 8 characters; See Note 2)	Date: Year: 19__	Time	Matrix	Preservative	Filtered/Unfiltered	Method	Expect Conc.	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis	Inorganics	Other	Remarks / Comments
MW-2D	9/17	16:15	W							X	X	X	mz
RBGWO1	9/17	15:30	W	O	FLU	C	X	9	6mz	X	X	X	Only Dissolved Fe Filtered Preservation:
MW-2D	9/17	16:15	W	O	FLU	C	L	4	X		X	X	Voc's - HCL Metals/Fe - HNO₃ Cyanide - NaOH,
TB01	9/17		6	O	U	C	L	1	X				

Client's Special Instructions:

Lab: Received in Good Condition? Y or N

Describe Problems, if Any:

#1 Relinquished By: (Sig.) <i>[Signature]</i>	Date: 9/17	#2 Relinquished By: (Sig.)	Date:	#3 Relinquished By: (Sig.)	Date:	Sample Storage Time requested? (In days, see Note 3)
Company Name: Golden Ass.	Time: 1750	Company Name:	Time:	Company Name:	Time:	
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.) <i>[Signature]</i>	Date: 9/17	#3 Received By: (Sig.)	Date:	DESTROY or RETURN data after five years of archival? (Circle choice; see Note 4)
Company Name:	Time:	Company Name: Compu Chem	Time: 9:00	Company Name:	Time:	

Note (1): If "Y" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; If "N" lab will begin processing batches now. Note (2): If CLP inorganics data is required, it is limited to maximum of six characters.

Note (3): Samples stored 60 days after date report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

R2-0000547



COMPUCHEM
ENVIRONMENTAL
CORPORATION

3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

№ 1570

09/19/96 08:34

0

003/003

Ship to: Compuchem	Project Name: Canisford	Field Point-of-Contact: Coni Hendel
Carrier: Fedex	Sample Name: JDA/SN	Telephone No.: 609-273-1118
Airbill No.: 85034571	Sampler Signature: [Signature]	Sampling for project complete? YES (N) (See Note 1.)
		Project-specific (PS) or Batch (B) QC: PS

Box #1: 1. Surface Water 2. Ground Water 3. Leachate 4. Runoff 5. Soil/Sediment/Sludge	Box #2: 6. Tissue Blank 7. CR 8. Waste 9. Other	Box #3: 10. Blank 11. CR 12. Waste 13. Other	Box #4: 14. Blank 15. CR 16. Waste 17. Other	Box #5: 18. Blank 19. CR 20. Waste 21. Other
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Sample ID (Organics: 9 characters max, Inorganics: 6 characters; see Note 2)	Date: Year 19__	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect. Conc.	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis										Inorganics			Other		Remarks/Comments
										VOA-GCMS	SV-GCMS	PAH-GCMS	Herb-GC	VOA-GC	Metals	Mercury	Cyanides	Radiochemicals	TOC/TOX	OSG/TPH	Phenols	Other			
MW-2D	9/17	16:15	2		U	C	L	5	5	X	X						X								
	/	:																							
	/	:																							
	/	:																							
	/	:																							
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Client's Special Instructions: See Data Enhance			
Lab: Received in Good Condition? Y or N			
Describe Problems, if Any:			
#1 Relinquished By: (Sig.) [Signature]	Date: 9/17/96	#2 Relinquished By: (Sig.) [Signature]	Date: 9/17/96
Company Name: Golden Assoc	Time: 1700	Company Name: Compuchem	Time: 1700
#1 Received By: (Sig.) [Signature]	Date: 9/17/96	#2 Received By: (Sig.) [Signature]	Date: 9/17/96
Company Name: Compuchem	Time: 1700	Company Name: Compuchem	Time: 1700
Sample storage time requested? (in days, see Note 3) —		DESTROY or RETURN data after five years of archival? (Circle choice; see Note 4) —	

Note 1: If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC risk; if "Y" lab will begin processing batches now. Note 2: If CLP inorganics analysis required, ID limited to maximum of six elements. Note 3: Samples stored 60 days after date report mailed at no extra charge. Note 4: All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

09-19-96 08:55AM P093 #06

R2-0000548

002/010



COMPUCHEM
ENVIRONMENTAL
CORPORATION

3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

2 45

Ship to: CompuChem	Project Name: Canstadi	Field Point-of-Contact: Lori Hendel
Carrier: Fedex	Alrbill No.: 7550361512	Telephone No.: 605 273 1110
	Sampler Name: SM/mz/JRH/SN	Sampling for project complete? Y or (N) (See Note 1)
	Sampler Signature: <i>[Signature]</i>	Project-specific (PSI) or Batch (B) QC: —

Sample ID (Organics: 9 characters max, Inorganics: 6 characters; See Note 2)	Date: Year: 1996	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect Conc.	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis				Inorganics		Other		Remarks / Comments	
										VOA-GC/MS	SV-GC/MS	Pest/PCB-GC	Herb-GC	VOA-GC	Metals	Mercury	Cyanides		Radiologicals
MW-SD	9/18	0820	G	B	F	C	L	1											Iron only, Dissolved
MW-SD	↓	↓	G	B	U	C	L	1											TAL Metals
MW-SD	↓	↓	G	E	U	C	L	2		2									
MW-2R	9/18	:	G	B	F	C	L	1	MS										Iron only - Dissolved
	↓	:																	
	↓	:																	
	↓	:																	
	↓	:																	
	↓	:																	
	↓	:																	
	↓	:																	

Client's Special Instructions: **See Diane Ellmore**

Lab: Received in Good Condition? Y or N

Describe Problems, If Any:

#1 Relinquished By: (Sig.) <i>[Signature]</i>	Date: 9/18/96	#2 Relinquished By: (Sig.)	Date:	#3 Relinquished By: (Sig.)	Date:	Sample storage time requested? (In days, see Note 3)
Company Name: Golden Assoc	Time: 1715	Company Name:	Time:	Company Name:	Time:	
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.) <i>[Signature]</i>	Date: 9/18/96	#3 Received By: (Sig.)	Date:	DESTROY or RETURN data after five years of archival? (Circle choice; see Note 4)
Company Name:	Time:	Company Name:	Time: 1730	Company Name:	Time:	

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; if "Y" lab will begin processing batches now. Note (2): If CLP/Inorganics diskette required, ID limited to maximum of six characters.

Note (3): Samples stored 60 days after date report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

40

09-19-QR 01-18PM 0002 #11

08/18/96 13:24

R2-0000549



CHAIN OF CUSTODY RECORD

[illegible]

004/010



COMPUCHEM
ENVIRONMENTAL
CORPORATION

3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

130

Ship to: CompuChem	Project Name: Carlstadt	Field Point-of-Contact: Lori Harrell
Carrier: Fedex	Airbill No.: 7550861512	Sampler Name: SM/MZ
	Sampler Signature: <i>[Signature]</i>	Telephone No: 609 273-1110
		Sampling for project complete? Y or N (See Note 1)
		Project-specific (PS) or Batch (B) QC: PS

Sample ID (Organics: 9 characters max, Inorganics: 6 characters; See Note 2)			Date: Year: 19 ⁹⁶	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect. Conc.	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis				Inorganics		Other				Remarks / Comments	
												VOA-GC/MS	SV-GC/MS	Pest/PCB-GC	Herb-GC	VOA-GC	Metals	Mercury	Cyanides	Radiologicals	TOB/TOX		O&G/TPH
MW-2R			9/18	:	2	B	F	C	L	2	MS					2							Iron only, Dissolved
MW-2R			1	:	2	B	V	C	L	3	MS					3							TAL Metals
MW-2R			1	:	2	O	V	C	L	3	MS						3						
MW-2R			1	:	2	A	V	C	L	6	MS	1											
PAW			1	:																			
TB-02			9/18	0800	6	A	V	C	L	1		1											
			1	:																			
			1	:																			
			1	:																			
			1	:																			

Client's Special Instructions: **See Diane Ellmore**

Lab Received in Good Condition? Y or N

Describe Problems, if Any:

#1 Relinquished By: (Sig.) <i>[Signature]</i>	Date: 9/18/96	#2 Relinquished By: (Sig.)	Date:	#3 Relinquished By: (Sig.)	Date:	Sample storage time requested? (in days, see Note 3)
Company Name: Golden Assoc	Time: 1130	Company Name:	Time:	Company Name:	Time:	
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.) <i>[Signature]</i>	Date: 9/19/96	#3 Received By: (Sig.)	Date:	DESTROY or RETURN data after five years of archival? (Circle choice; see Note 4)
Company Name:	Time:	Company Name:	Time: 1130	Company Name:	Time:	

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; if "Y" lab will begin processing batches now. Note (2): If CLP Inorganics data is required, ID is limited to maximum of six characters.

Note (3): Samples stored 60 days after date report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

[Signature]

R2-0000551

CO-110-06 01-4RDM 0004 #11

09/19/96 13:28


**COMPUCHEM
ENVIRONMENTAL
CORPORATION**

 3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

No 9997

Ship to: CompuChem		Project Name: Constadt	Field Point-of-Contact: Loni Herdel
Carrier: Fedex		Airbill No.: 755 0361512	Sampler Name: SM/m2
Sampler Signature: <i>[Signature]</i>		Telephone No.: 609 2731110	
Project-specific (PFI) or Batch #:		Sampling for project complete? Y or N (See Note 1)	
Box #1: 1. Surface Water 2. Ground Water 3. Leachate 4. Effluent 5. Soil / Sediment / Sludge	Box #2: A. HCl B. HNO ₃ C. NaHSO ₄ D. Na ₂ SO ₄ E. Ice Only F. Other N. Not Preserved	Box #3: P. Filtered U. Unfiltered	Box #4: C. CLP 3/80 S. SW-846 W. CWA 600-series L. Low Conc. CLP R. Radiological T. TCLP Q. Other
Box #5: H - High M - Medium L - Low			

Sample ID (Organics: 9 characters max; Inorganics: 8 characters; See Note 2)	Date: Year: 19	Time	Box #1	Box #2	Box #3	Box #4	Box #5	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis				Inorganics			Other				Remarks / Comments
			Matrix	Preservative	Filtered/Unfiltered	Method	Expect. Conc.			VOL-GC/MS	SV-GC/MS	Pest/POB-GC	Hept-GC	VOL-GC	Metals	Mercury	Cyanides	Radiologicals	TOC/TOX	Oil/TPH	
MW-2R	9/18	:	2	E	U	C	L	5	MS	5										USE for MS/MSD	
MW-2R	9/18	:	2	E	U	C	L	3	MS	3											
	/	:																			
	/	:																			
	/	:																			
	/	:																			
	/	:																			
	/	:																			

Client's Special Instructions: **See Diane Elmore**

Lab: Received in Good Condition? Y or N

Describe Problems, if Any:

#1 Relinquished By: (Sig.) <i>[Signature]</i>	Date: 9/18/98	#2 Relinquished By: (Sig.)	Date:	#3 Relinquished By: (Sig.)	Date:	Sample storage time requested? (In days, see Note 3)
Company Name: Golden Assoc	Time: 1:15	Company Name:	Time:	Company Name:	Time:	
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.) <i>[Signature]</i>	Date: 9/18/98	#3 Received By: (Sig.)	Date:	DESTROY or RETURN data after five years of archival? (Circle choice, see Note 4)
Company Name:	Time:	Company Name:	Time: 9:30	Company Name:	Time:	

Note (1): M*Lab will hold samples to allow remainder of project-maximizing batch size and minimizing QC tails; if **Lab will begin processing batches now. Note (2): If CLP Inorganics data/te required, IQ limited to maximum of six characters.

Note (3): Samples stored 60 days after data report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

09/19/98 13:27



09-19-96 01:46PM PAGE #11

COC2.XLS

R2-0000553

09/19/96 13:27 8



09-19-98 01:46PM P007 #11

R2-0000554

008/010



COMPUCHEM
ENVIRONMENTAL
CORPORATION

3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

Ship to: Compuchem	Project Name: Conlstadt	Field Point-of-Contact: Lori Hendel
Carrier: Fedex	Airbill No.: 755034512	Telephone No.: 609-273-1110
	Sampler Name: JRH/sw	Sampling for project complete? Y or (N) (See Note 1)
	Sampler Signature: <i>[Signature]</i>	Project-specific (PS) or Batch (B) QC: ---

Box #1: 1. Surface Water 2. Ground Water 3. Leachate 4. Runoff 5. Soil / Sediment / Sludge	Box #2: A. HCl B. HNO ₃ C. NaOH D. H ₂ O E. Ice Only F. Other: NaOH G. Not Preserved	Box #3: 1. Filtered 2. Unfiltered	Box #4: C. CLP 3/80 D. 654-648 E. CWA 600-series F. Low Conc. CLP	Box #5: H. High I. TOLP J. Other: --- K. Low
--	---	--------------------------------------	--	--

Sample ID (Organics: 8 characters max; Inorganics: 8 characters; See Note 2)	Date: Year: 19 96	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect. Conc.	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis				Inorganics		Other				Remarks / Comments	
										VOA-GC/MS	SV-GC/MS	Post-/PCB-GC	Herb-GC	VOA-GC	Metals	Mercury	Cyanides	Radiochemicals	TOC/TOX		OMG/TPH
MW-7D	9/18	14:50	G	B	F	C	L	1							1						Iron only (Dissolved)
MW-7D	9/18	14:30	G	O	U	C	L	1							1						
MW-5D	9/18	09:20	G	E	U	C	L	2				2									
↓	↓	↓	G	O	U	C	L	1							1						
MW-5D	9/18	09:20	G	A	U	C	L	2			2										
	1	:																			
	1	:																			
	1	:																			
	1	:																			
	1	:																			

Client's Special Instructions: See Diane Simone					
Lab: Received in Good Condition? Y or N _____ Describe Problems, if Any: _____					
#1 Relinquished By: (Sig.) <i>[Signature]</i>	Date: 9/18/96	#2 Relinquished By: (Sig.)	Date:	#3 Relinquished By: (Sig.)	Date:
Company Name: Golden Assoc	Time: 1705	Company Name:	Time:	Company Name:	Time:
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.)	Date:	#3 Received By: (Sig.)	Date:
Company Name:	Time:	Company Name:	Time:	Company Name:	Time:

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; if "Y" lab will begin processing batches now. Note (2): If CLP Inorganics datasets required, ID limited to maximum of six characters.
Note (3): Samples stored 60 days after data report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

09-19-96 01:46PM P008 #11

R2-0000555

008/010



**COMPUCHEM
ENVIRONMENTAL
CORPORATION**

3306 Chapel Hill/Nelson Highway
Chapel Hill, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

No. 418

Ship to: CompuChem	Project Name: Carlstadt	Field Point-of-Contact: Lori Hendel
Carrier: FedEx	Airbill No.: 7550361512	Sampler Name: SM/MZ
Box #1: 1. Surface Water 2. Ground Water 3. Leachate 4. Fluvial 5. Soil / Sediment / Sludge	Box #2: A. H ₂ O B. HNO ₃ C. NaHSO ₄ D. Na ₂ S ₂ O ₃ E. Ice Only F. Other None N. Not Preserved	Box #3: F. Filtered U. Unfiltered
Box #4: C. CLP 3/80 9. SW-048 VI. CWA 600-series L. Low Conc. CLP	Box #5: H. High M. Medium L. Low	Box #6: R. Radiological T. TCLP O. Other

Sample ID (Organics: 0 characters max; Inorganics: 6 characters; See Note 2)	Date: Year: 1996	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect. Conc.	Box #6 No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis													Inorganics	Other	Remarks / Comments
										VOA-GC/MS	SV-GC/MS	Post/PCB-GC	Heb-GC	VOA-GC	Metals	Mercury	Cyanides	Radionuclides	TOC/TOX	OSG/TPH	Phenols	Other			
MW-2R	9/18/96	14:45	2	2	U	C	L	3	MS	3															Triple volume for MS/MSD
MW-2R	9/18/96	14:45	2	2	U	C	L	1	MS	1															
MW-8D	9/18/96	17:05	2	0	U	C	L	1																	

Client's Special Instructions: **See Data Sheet**

Lab Received in Good Condition? Y or N	Describe Problems, If Any:					
#1 Relinquished By: (Sig.) [Signature]	Date: 9/18/96	#2 Relinquished By: (Sig.)	Date:	#3 Relinquished By: (Sig.)	Date:	Sample storage time requested? (in days, see Note 3)
Company Name: Golden Assoc	Time: 1800	Company Name:	Time:	Company Name:	Time:	
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.) [Signature]	Date: 9/18/96	#3 Received By: (Sig.)	Date:	DESTROY or RETURN date after five years of archive? (Circle choice; see Note 4)
Company Name:	Time:	Company Name:	Time: 10:30	Company Name:	Time:	

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; if "Y" lab will begin processing batches now. Note (2): If C.P. Inorganics diskette required, ID limited to maximum of six characters.

Note (3): Samples stored 90 days after date report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

09-19-96 01:46PM Page #11

09/18/96 13:28

R2-0000556

010/010



COMPUCHEM
ENVIRONMENTAL
CORPORATION

3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

Ship to: Compu Chem	Project Name: Carlstadt	Field Point-of-Contact: Lore Hendel
Carrier: Fed Ex	Airbill No.:	Telephone No.: 609-273-1110
	Sampler Name: JR/SJ	Sampling for project complete? Y or (N) (See Note 1)
	Sampler Signature: <i>[Signature]</i>	Project-specific (PS) or Batch (B) QC: _____

BOX #1: 1. Surface Water 2. Ground Water 3. Leachate 4. Pileate 5. Soil / Sediment / Sludge	6. Tap Water 7. Oil 8. Waste 9. Other	Box #2: A. HCl B. HNO ₃ C. NaOH D. Na ₂ SO ₄	E. Ice Only F. Other G. Not Preserved	Box #3: F. Filtered U. Unfiltered	Box #4: C. CLP 3/80 S. SW-846 W. CWA 600-series L. Low Conc. CLP	H. Radiological I. TCLP J. Other	Box #5: H. High M. Medium L. Low
---	--	--	---	--------------------------------------	---	--	--

Sample ID (Organics: 9 characters max; Inorganics: 8 characters; See Note 2)		Date: Year: 19 96	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect. Conc.	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis				Inorganics			Other			Remarks / Comments		
											VOA-GC/MS	SV-GC/MS	Pass/PCB-GC	Herb-GC	VOA-GC	Metals	Mercury	Cyanides	Radiologicals	TOC/TOX		O&G/TPH	Phenols
#1	W-7D	9/18	14:30	2	A	U	C	L	2		2												Only dissolved Fe
				2	F	U	C	L	2		2												filtered 4/11/96
				2	F	U	C	L	2		2												Preservation:
				2	B	U	C	L	1							1							Voc's = HCl
		1	:																				Metals / Fe = HNO ₃
		1	:																				Cyanide - NaOH
		1	:																				
		1	:																				
		1	:																				
		1	:																				
		1	:																				

Client's Special Instructions: **See Diarré Eilmore**

Lab: Received In Good Condition? Y or N

Describe Problems, If Any:

#1 Relinquished By: (Sig.) <i>[Signature]</i>	Date: 9/18/96	#2 Relinquished By: (Sig.)	Date:	#3 Relinquished By: (Sig.)	Date:	Sample storage time requested? (In days, see Note 3)
Company Name: Gordon Assoc.	Time: 1700	Company Name:	Time:	Company Name:	Time:	
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.) <i>[Signature]</i>	Date: 9/19/96	#3 Received By: (Sig.)	Date:	DESTROY or RETURN data after five years of archival? (Circle choice; see Note 4)
Company Name:	Time:	Company Name: CompuChem	Time: 9:30	Company Name:	Time:	

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; if "Y" lab will begin processing batches now. Note (2): If CLP Inorganics diskette required, ID limited to maximum of six characters.

Note (3): Samples stored 60 days after data report mailed at no extra charge. Note (4): All lab copies of data destroyed after two years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

4/0

R2-0000557



P.002/002

WDB
9-19-56

R2-0000558

09-20-96 09:55AM P002 #18

002/007


**COMPUCHEM
ENVIRONMENTAL
CORPORATION**

 3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD
No 16363

Ship to: CompuChem		Project Name: Canistadt		Field Point-of-Contact: Len, Hester	
Carrier: Fedex		Airbill No.: 755034523		Sampler Name: TRA/sm/mz/AP	
Box #1: 1. Surface Water 2. Ground Water 3. Leachate 4. Sludge 5. Soil / Sediment / Sludge		Box #2: A. HCl B. HNO ₃ C. NaHSO ₄ D. Na ₂ S ₂ O ₃		Box #3: F. Filtered U. Unfiltered	
Box #4: G. CLP 3/80 S. SVX-548 W. CVA 600-series L. Low Conc. CLP		Box #5: R. Radiological T. TCLP O. Other		Box #6: H. High M. Medium L. Low	
Sampling for project complete? Y or N (See Note 1)		Project-specific (PS) or Batch (B) QC: PS			

Sample ID (Organics: 8 characters max; Inorganics: 6 characters; See Note 2)	Date: Year: 19	Time	Box #1	Box #2	Box #3	Box #4	Box #5	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis				Inorganics		Other				Remarks / Comments	
			Matrix	Preservative	Filtered/Unfiltered	Method	Expect. Conc.			VOA-GC/MS	SV-GC/MS	Pest/PCB-GC	Herb-GC	VOA-GC	Metals	Mercury	Cyanides	Radiologicals	TOC/TOX		O&G/TPH
GWR6-03	9/19	1430	4	E	U	C	L	3		V	V										
			4	B	U	C	L	1													TAL Metals
			4	B	F	C	L	1													Iron only, dissolved
			4	A	U	C	L	2	2												Both Lab. RBGW03
	/	:																			Per M.S. 9/20/96
	/	:																			
	/	:																			
	/	:																			
	/	:																			
	/	:																			

 Client's Special Instructions: **See State 24 memo**

Lab. Received in Good Condition? Y or N		Describe Problems, if Any:	
#1 Relinquished By: (Sig.) G. Hendrix	Date: 9/19/96	#2 Relinquished By: (Sig.)	Date:
Company Name: Golden Assoc	Time: 1605	Company Name:	Time:
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.)	Date:
Company Name:	Time:	Company Name:	Time:
Date: 9/20/96		Date: 9/20/96	
Time: 9:30		Time: 9:30	
Sample storage time requested? (In days, see Note 3)		DESTROY or RETURN data after five years of archival? (Circle choice; see Note 4)	

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratios; if "Y" lab will begin processing batches now. Note (2): If C.P. Inorganics analysis required, it is limited to maximum of six characters.

Note (3): Samples stored 60 days after date report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year 5.

09-20-96 01:30PM P002 #26

09/20/96 13:08 6

R2-0000559

003/007



COMPUCHEM
ENVIRONMENTAL
CORPORATION

3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

No 16364

Ship to: CompuChem		Project Name: Cricket		Field Point-of-Contact: Lori Hartsel	
Carrier: FedEx		Airbill No.: 7550361523		Telephone No.: 659-273-1110	
Sample Signature: <i>[Signature]</i>		Sampling for project complete? Y or N (See Note 1)		Project-specific (PS) or Batch (B) QC: PS	
Box #1: 1. Surface Water 2. Ground Water 3. Leachate 4. Effluent 5. Soil / Sediment / Sludge 6. Trip Blank 7. Oil 8. Vials 9. Other		Box #2: A. HCl B. HNO ₃ C. NaHSO ₄ D. Na ₂ S ₂ O ₃ E. Ice Only F. Other G. Not Preserved		Box #3: F. Filtered G. Unfiltered H. Radiological I. TCLP J. Other K. CLP 3/90 L. SW-846 M. CWA 900-series N. Low Conc. CLP	
Box #4: K. High L. Medium M. Low					

Sample ID (Organics: 9 characters max, Inorganics: 6 characters; See Note 2)	Date: Year: 19 <u>96</u>	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect. Conc.	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis				Inorganics		Other				Remarks / Comments
										VOA-GC/MS	SV-GC/MS	Post/PCB-GC	Hept-GC	VOA-GC	Metals	Mercury	Cyanides	Radiologicals	TOC/TOX	
MW-18D	9/15	13:15	2	B	U	C	L	2		2										
MW-18D	9/15	13:15			U			2		2										
MW-18DD	9/15	13:15		V	U			1		1										
MW-18DD	9/15	13:15	V	B	U			1												TAL Metals
	1	:																		
	1	:																		
	1	:																		
	1	:																		
	1	:																		
	1	:																		
	1	:																		

Client's Special Instructions:

Lab: Received in Good Condition? Y or N		Describe Problems, if Any:			
#1 Relinquished By: (Sig.) <i>[Signature]</i>	Date: 9/15	#2 Relinquished By: (Sig.)	Date:	#3 Relinquished By: (Sig.)	Date:
Company Name: G. J. R. Air	Time: 10:40	Company Name:	Time:	Company Name:	Time:
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.) <i>[Signature]</i>	Date: 9/20/96	#3 Received By: (Sig.)	Date:
Company Name:	Time:	Company Name:	Time: 9:30	Company Name:	Time:
Sample storage time requested? (14 days, see Note 3)			DESTROY or RETURN data after five years of archival? (Circle choice: see Note 4)		

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; if "Y" lab will begin processing batches now. Note (2): If C.P. Inorganics diskette required, limited to maximum of six characters.

Note (3): Samples stored 60 days after data report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

09-20-96 01:30PM P003 #26

09/20/96 13:09

R2-0000560



3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

No 16362

Ship to: Compuchem	Project Name: Carlstadt	Field Point-of-Contact: Lori Hendel
Carrier: Fedex	Airbill No.: 7550361523	Sampler Name: JH/Sm/AP/mz
Sampler Signature: <i>[Signature]</i>	Sampling for project complete? Y or (N) (See Note 1)	Project-specific (PS) or Batch (B) QC: (PS)
Box #1: 1. Surface Water 2. Ground Water 3. Leachate 4. Filtrate 5. Soil / Sediment / Sludge 6. Trip Blank 7. Oil 8. Waste 9. Other	Box #2: A. HCl B. HNO ₃ C. NaHSO ₄ D. Na ₂ S ₂ O ₃ E. Ice Only F. Other NaOH G. Not Preserved	Box #3: F. Filtered U. Unfiltered
Box #4: G. O.P. 3/80 S. SW-846 W. CWA 600-series L. Low Conc. CUP	Box #5: H. High M. Medium L. Low	

Sample ID (Organics: 9 characters max; Inorganics: 8 characters; See Note 2)	Date: Year: 19 96	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect. Conc.	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analysis	Inorganics	Other	Remarks / Comments
MW-9S	9/19	1249	2	E	U	C	L	2		2			
✓	✓	✓	2	E	U	C	L	2		2			
✓	✓	✓	2	B	U	C	L	1					TAL Metals
MW-18DD	1315	2	B	F	C	L	1						Iron only, Dissolved
MW-9S	1249	2	O	U	C	L	1						
MW-18DD	1315	2	E	U	C	L	1			1			
MW-9S	1249	2	A	U	C	L	2			2			
MW-8R	0945	2	A	U	C	L	2			2			
MW-18DD	1315	2	A	U	C	L	2			1			
TB-03	0830	6	A	U	C	L	1			1			

Client's Special Instructions: **See Diane Silmore**

Lab: Received in Good Condition? Y or N	Describe Problems, if Any:				
#1 Relinquished By: (Sig.) <i>[Signature]</i>	Date: 9/19/96	#2 Relinquished By: (Sig.)	Date:	#3 Relinquished By: (Sig.)	Date:
Company Name: Golden Asser	Time: 1545	Company Name:	Time:	Company Name:	Time:
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.) <i>[Signature]</i>	Date: 9/20/96	#3 Received By: (Sig.)	Date:
Company Name:	Time:	Company Name:	Time: 1545	Company Name:	Time:

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC run; if "Y" lab will begin processing batches now. Note (2): ICLP Inorganics diskette required. ID limited to maximum of six characters.

Note (3): Samples stored 60 days after date report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

005/007


**COMPUCHEM
ENVIRONMENTAL
CORPORATION**

 3306 Chapel Hill/Neison Highway
Research Triangle Park, NC 27709

1-800-833-5097

CHAIN-OF-CUSTODY RECORD
No 15021

Ship to: CompuChem		Project Name: Carlstadt		Field Point-of-Contact: Lori Hendel	
Carrier: Fedex		Airbill No.: 7550761523		Sampler Name: sm/mz	
Box #1: 1. Surface Water 2. Ground Water 3. Leachates 4. Runoffs 5. Soil / Sediment / Sludge 6. Trip Blank 7. Oil 8. Wastes 9. Other		Box #2: A. HCl B. HNO ₃ C. NaHSO ₄ D. Na ₂ S ₂ O ₃ E. Ice Only F. Other NaOH G. Not Preserved		Box #3: F. Filtered U. Unfiltered	
Box #4: C. CLP 250 S. SW-846 W. CWA 600-series L. Low Conc. CLP		Box #5: H. High M. Medium L. Low		Telephone No.: 609 273 1110 Sampling for project complete? Y or N (See Note 1) Project-specific (PS) or Batch (B) QC: PS	

Sample ID (Organics: 8 characters max; Inorganics: 8 characters; See Note 2)	Date: Year: 19	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect. Conc.	No. of Bottles	Use for Lab QC (MS or DUP)	Organics Analytes Inorganics Other													Remarks / Comments
										VOA-GC/MS	SV-GC/MS	pest/PCB-GC	Herb-GC	VOA-GC	Metals	Mercury	Cyanides	Radiochemicals	TOC/TOX	O&G/TPH	Phenols	Other	
MW-17D	9/19	1021	2	E	U	C	L	2		2													
			2	E	U	C	L	2		2													
			2	B	U	C	L	1							1								TAL Metals
			2	B	F	C	L	1							1								Iron only, Dissolved
			2	O	U	C	L	1							1								
			2	A	U	C	L	2		2													
TB-03	9/19	0800	6	A	U	C	L	1		1													Analyze only one Trip blank
MW-18D	9/19	1215	2	A	U	C	L	2		2													
	9/19	1315	2	B	F	C	L	1							1								Iron only, Dissolved
MW-18DD	9/19	1315	2	A	U	C	L	1		1													

Client's Special Instructions: **See Data Sheet**

Lab Received in Good Condition? Y or N

Describe Problems, if Any:

#1 Relinquished By: (Sig.) **Q. Hendel**#2 Relinquished By: (Sig.) **Q. Hendel**Date: **9/20/96**Time: **1:15**Company Name: **Golden Assoc.**

Company Name:

#1 Received By: (Sig.)

Date:

#2 Received By: (Sig.) **Q. Hendel**

Time:

Company Name:

#3 Received By: (Sig.) **Q. Hendel**Date: **9/20/96**Time: **1:30**

Company Name:

Date: **9/20/96**Time: **1:30**

Sample storage time requested? (In days, see Note 3)

DESTROY or RETAIN data after five years of archival? (Circle choice; see Note 4)

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; If "Y" lab will begin processing batches now. Note (2): If CLP Inorganics distillate required, ID limited to maximum of six characters.

Note (3): Samples stored 60 days after date report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies; archival storage fee billed in January of year six.

09-20-96 01:30PM P005 #26

09/20/96 13:10

R2-0000562

09/20/98



No 16361

Client's Special Instructions: <i>See Diaro Elmore</i>					
Lab. Received in Good Condition? Y or N		Describe Problems, If Any:			
#1 Relinquished By: (Sig.) <i>[Signature]</i>	Date: <i>9/15/91</i>	#2 Relinquished By: (Sig.)	Date:	#3 Relinquished By: (Sig.)	Date:
Company Name: <i>Golden Assoc</i>	Time: <i>1:00</i>	Company Name:	Time:	Company Name:	Time:
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.) <i>[Signature]</i>	Date:	#3 Received By: (Sig.)	Date:
Company Name:	Time:	Company Name:	Time:	Company Name:	Time:
				DESTROY or RETURN date after five years of archival? (Circle choice; see Note 4)	

R2-0000563

09-20-96 01:30PM P006 #26



**COMPUCHEM
ENVIRONMENTAL
CORPORATION**

**3306 Chapel Hill/Nelson Highway
Research Triangle Park, NC 27709**

1-800-833-5097

CHAIN-OF-CUSTODY RECORD

№ 16366

Ship to: <i>Compuchem</i>		Project Name: <i>Conslstat</i>		Field Point-of-Contact: <i>Lori Hendel</i>	
		Sampler Name: <i>JNE/sm/AT/mz</i>		Telephone No.: <i>6092731110</i>	
Carrier: <i>Fedex</i> Airbill No.: <i>7550361523</i>		Sampler Signature: <i>[Signature]</i>		Sampling for project complete? Y <input checked="" type="checkbox"/> N <input type="checkbox"/> (See Note 1)	
		Project-specific (PS) or Batch (B) QC: _____			
Box #2: A. HCl B. HNO ₃ C. NaHSO ₄ D. Na ₂ S ₂ O ₅ E. Ice Only O. Other: <i>NaOH</i> N. Not Preserved		Box #3: F. Filtered U. Unfiltered		Box #4: C. CLP 3750 S. SW-848 V. CWA 604-200-0008 L. Low Conc. CLP R. Radiological T. TCLP O. Other: _____	
				Box #5: H. High M. Medium L. Low	

[illegible]

Client's Special Instructions: See Diane Ellmore

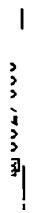
Lab: Received in Good Condition? Y or N		Describe Problems, If Any:							
#1 Relinquished By: (Sig.)	<i>Handwritten Signature</i>	Date:	<i>Handwritten Date</i>	#2 Relinquished By: (Sig.)		Date:		#3 Relinquished By: (Sig.)	
Company Name:	<i>Golden Assoc.</i>	Time:	<i>Handwritten Time</i>	Company Name:		Time:		Company Name:	
#1 Received By: (Sig.)		Date:		#2 Received By: (Sig.)	<i>Handwritten Signature</i>	Date:	<i>Handwritten Date</i>	#3 Received By: (Sig.)	
Company Name:		Time:		Company Name:	<i>Handwritten Name</i>	Time:	<i>Handwritten Time</i>	Company Name:	

Note (1): If "N" lab will hold samples to await remainder of project or maximize batch size and minimize QC ratio, if "Y" lab will begin processing batches now. Note (2): If CLP "organics" diskette required ID limited to maximum of six characters.

Note (3): Samples shown 30 days after date report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client re-requests and pays for return of copies; annual storage fee billed in January of year six.

09-20-96 01:30PM P007 #26

R2-0000564



09-23-96 10:06AM P002 #50

09/23/98 09:44 8

R2-0000565

09/23/98



CHAIN OF CUSTODY RECORD

09-23-96 10:06AM P003 #50

[illegible]

COC2.XLS

R2-0000566

09/23/96 09:45



**Golder
Associates**

CHAIN OF CUSTODY RECORD

[illegible]

COC2.XLS

R2-0000567

09-23-96 10:06AM P004 #50

09/23/96 09:45 8

[illegible]

COC2.XLS

09-23-96 10:06AM P005 #50

R2-0000568

09/23/98



CHAIN OF CUSTODY RECORD

[illegible]

COC2.XLS

09-23-96 10:06AM P006 #50

R2-0000569



FRESH PONDS CORPORATION VILLAGE, BUILDING B
2235 ROUTE 130, DAYTON, OH 45424
908-329-0200 FAX: 908-329-3499/3480

ACCU TEST QUOTE B:

908 329 3499

P.002/002

R2-0000570



ACCUTEST

GW
FR

CHAIN OF CUSTODY

FRESH PONDS CORPORATE VILLAGE, BUILDING B
2235 ROUTE 130, DAYTON, NJ 08810
908-329-0200 FAX: 908-329-3498/3480

ACCUTEST JOB #:

ACCUTEST QUOTE #:

CLIENT INFORMATION		FACILITY INFORMATION		ANALYTICAL INFORMATION										MATRIX CODE					
NAME Golden Associates		PROJECT NAME Carlstadt		<div style="display: flex; flex-direction: column; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">Manganese, Ethanol, Ethene</div> <div>Sulfide</div> <div>TOC, TKN, NO₂, TPO₄</div> <div>ALK 504, NO₃, Cl</div> </div>										DW - DRINK WATER GW - GROUND WATER WW - WASTEWATER SO - SOIL SL - SLUDGE OL - OIL LIQ - LIQUID SOL - SOLID					
ADDRESS		LOCATION Carlstadt, NJ																	
CITY, STATE ZIP		PROJECT NO. 943-6222																	
SEND REPORT TO: PHONE # 609-273-1110		FAX #																	
ACCUTEST SAMPLE #	FIELD ID / POINT OF COLLECTION	COLLECTION			MATRIX	# OF BOTTLES	PRESERVATION										LAB USE		
		DATE	TIME	SAMPLED BY			HCl	NaOH	HNO ₃	H ₂ SO ₄	H ₂ O ₂	None	Other						
E14820-1	MW-16D	9/23/96	1445	JH/AF	GW	5				X	X	X	2	1	1	1			DG, 45
-2	RMW-13D	9/23/96	1125	JH/AF		5				X	X	X	2	1	1	1			
-3	MW-12D	9/23/96	1142	SM/MZ		5				X	X	X	2	1	1	1			
-4	MW-14D	9/23/96	0920	JH/AF		5				X	X	X	2	1	1	1			
-5	MW-14R	9/23/96	0905	SM/MZ		5				X	X	X	2	1	1	1			
-6	MW-14RD	9/23/96	0905	SM/MZ		5				X	X	X	2	1	1	1			
-7	MW-12S	9/23/96	1500	SM/MZ		5				X	X	X	2	1	1	1			NOT RECD, 9-24-96
-7	RBGW-05	9/23/96	1600	SM/MZ	RB	5				X	X	X	2	1	1	1			DG 45

DATA TURNAROUND INFORMATION		DATA DELIVERABLE INFORMATION		COMMENTS/REMARKS	
<input checked="" type="checkbox"/> 21 DAYS STANDARD <input type="checkbox"/> 14 DAYS RUSH <input type="checkbox"/> 7 DAYS EMERGENCY <input type="checkbox"/> OTHER	APPROVED BY: _____	<input checked="" type="checkbox"/> NJ REDUCED <input type="checkbox"/> NJ Full <input type="checkbox"/> FULL CLP <input type="checkbox"/> DISK DELIVERABLE <input type="checkbox"/> OTHER (SPECIFY)	<input type="checkbox"/> COMMERCIAL "A" <input type="checkbox"/> COMMERCIAL "B" <input type="checkbox"/> STATE FORMS	SAMPLES RECEIVED ON SITE AT ACCUTEST _____ _____ _____	
21 DAY TURNAROUND HARD COPY, EMERGENCY OR RUSH IS FAX DATA UNLESS PREVIOUSLY APPROVED		RED/T2			

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION, INCLUDING COURIER DELIVERY					
RELINQUISHED BY: 1. <i>[Signature]</i>	DATE/TIME: 9/23/96 1720	RECEIVED BY: 1. <i>[Signature]</i>	DATE/TIME: 9/23/96 1826	RELINQUISHED BY: 2. <i>[Signature]</i>	DATE/TIME: 9-24-96 1836
RELINQUISHED BY: 2. _____	DATE/TIME: _____	RECEIVED BY: 2. _____	DATE/TIME: _____	RELINQUISHED BY: 3. _____	DATE/TIME: _____
RELINQUISHED BY: 3. _____	DATE/TIME: _____	RECEIVED BY: 3. _____	DATE/TIME: _____	RELINQUISHED BY: 4. _____	DATE/TIME: _____
RELINQUISHED BY: 4. _____	DATE/TIME: _____	RECEIVED BY: 4. _____	DATE/TIME: _____	RELINQUISHED BY: 5. _____	DATE/TIME: _____

P. 003-004
 TO 16092730778
 FROM ACCUTEST LABORATORIES
 SEP-25-1996 8:39

1003 #42
 908 329 3499

09/24/98 12:28



CHAIN OF CUSTODY RECORD

[illegible]

COC2.XLS

09-24-96 12:49PM P002 #26

R2-0000572



CHAIN OF CUSTODY RECORD

[illegible]

09/24/98



CHAIN OF CUSTODY RECORD

[illegible]

COC2.XLS

09-24-96 12:49PM P004 #26

R2-0000574

[illegible]

[illegible]

09/24/98 12:29



CHAIN OF CUSTODY RECORD

[illegible]

COC2.XLS

09-24-96 12:49PM P007 #26

R2-0000577



CHAIN OF CUSTODY RECORD

[illegible]



CHAIN OF CUSTODY RECORD

[illegible]

COC2.XLS

PW-01
Rec'd

R2-0000579

09/25/98 13:22



CHAIN OF CUSTODY RECORD

[illegible]

COC2.XLS

09-25-96 01:43PM P002 #49

R2-0000580

09/25/98 13:22

09-25-96 01:43PM P003 #49

R2-0000581

09/25/98 13:22



CHAIN OF CUSTODY RECORD

[illegible]

COC2.XLS

09-25-96 01:43PM P004 #49

R2-0000582

09/25/98 13:23



09-25-96 01:43PM P005 #49

4^B

R2-0000583



CHAIN OF CUSTODY RECORD

PROJ. NO. 943-6222		PROJECT NAME Carlstadt			NO. OF CON- TAINERS	CONTAINER TYPE					REMARKS	
SAMPLERS: SM/JPL/M2/AP						VDA						
SAMPLE	DATE	TIME	MATRIX	SAMPLE LOCATION								
	9/24/96	1132	GW	MW-11D		2						
		0927		MW-15D		2						
		1045		MW-11R		4				Extra Volume - use as ms/msd		
		0950		MW-11S		2						
		1300	RB	RBGW-06		2						
		1530	RB	RBSW-07		2						
		1420	SW	SW-01		2						
		1430		SW-02		4				Extra Volume - use as ms/msd		
		1448		SW-03		2						
		1509		SW-04		2						
	✓	1448	✓	SW-03D		2						
RELINQUISHED BY: (Signature)					Date / Time	RECEIVED BY: (Signature)					Date / Time	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)					Date / Time	RECEIVED BY: (Signature)					Date / Time	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)					Date / Time	RECEIVED FOR LABORATORY BY:					Date / Time	REMARKS:
					10/24/96 1545						9/25/96 9:45	RBSW-07, SW-01-SW-04, and SW-03D create own SDG.

COC2.XLS

yes
to ab rec'd

R2-0000584

09/25/96 13:23 8

[illegible]

COC2.XLS

R2-0000585

09-25-96 01:43PM P007 #49



GW
FB

CHAIN OF CUSTODY

FRESH PONDS CORPORATE VILLAGE, BUILDING B
2235 ROUTE 130, DAYTON, NJ 08810
908-329-0200 FAX: 908-329-3499/3480

ACCUTEST JOB #:

ACCUTEST QUOTE #:

004-#42

[illegible]

R2-0000586

APPENDIX H
Validation Narrative

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4.0 TARGET COMPOUND LIST PESTICIDES/PCBS	H-8
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1.0 INTRODUCTION

Analytical data collected between September 16 through September 24, 1996 at the 216 Paterson Plank Road NPL Site in Carlstadt, New Jersey has been validated as part of the Off-Property Investigation (Investigation). The samples were collected as specified by the Final Work Plan Amendment, December, 1995. The sample points chosen for analysis and the parameters which were analyzed are described in the Sampling, Analysis and Monitoring Plan (SAMP) and the Quality Assurance Project Plan (QAPjP). Samples from the Quarterly Operation and Maintenance (O&M) Monitoring Program and the Investigation were collected concurrently. For the purpose of this report, only the samples collected in support of the Investigation are discussed. The analytical results and results of the data review and validation for the Quarterly O&M monitoring wells was presented in the Quarterly O&M Report submitted to the USEPA in December 1996.

The samples were analyzed for the Inorganic Target Analyte List (TAL) plus cyanide in accordance with the U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration (CLP SOW ILM03.0); and the Organic Target Compound List (TCL) in accordance with the Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration (CLP SOW OLM03.1) for Volatiles Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs) and Pesticides/PCBs. All of the groundwater monitoring well samples for metals analysis were collected as unfiltered (total). In addition to the TCL and TAL analyses plus cyanide, the samples collected as part of the Investigation were analyzed for Sulfide, Total Organic Carbon (TOC), Total Kjeldahl Nitrogen (TKN), Nitrate/Nitrite, total-Phosphorous, Alkalinity, Sulfate, Chloride and Methane, Ethane and Ethene, hereafter referenced as Inorganic List Parameters. Also, there were a select group of wells that were sampled for filtered (dissolved) Iron. The TCL/TAL analyses were performed by CompuChem Environmental (CompuChem) of Research Triangle Park, North Carolina. The Inorganic List Parameters analyses were performed by Accutest of Dayton, New Jersey.

Samples were collected from 10 primary locations. In addition, a sample of the on-Site potable water supply (PW-01) was taken and analyzed for TCL/TAL plus cyanide. Two sampling locations were sampled in duplicate for Field Duplicate analysis. The Sample Identification Points, sampling dates and the corresponding Sample Delivery Groups (SDGs) are summarized in Table H1.

Data validation of inorganic data collected using the CLP SOW ILM03.0 was performed in accordance with the USEPA Region II Standard Operating Procedure (SOP) No. HW-2, Revision 11, Evaluation of Metals Data for the Contract Laboratory Program (dated January, 1992). Data validation for the organics was performed in accordance with the USEPA Region II SOP No. HW-6, Revision 9, CLP Organics Data Review and Preliminary Review, dated January 1994. These documents are referred to as "functional guidelines" hereafter. Non-TCL/TAL analytical data were validated using the method-specific criteria as well as the criteria specified in the QAPjP dated September 1995.

Data qualifiers are defined in Table H2. Where quality control criteria were met, positive results were not qualified and non-detected results were qualified with a "U" flag signifying that the result is below the quantitation limit (organics) or detection limit (inorganics). Where more than one qualifier for a sample result was warranted, the most predominant or general qualifier was applied to the results. For example, a positive result for a volatile organic compound may need to be qualified as undetected (U) due to its presence in the associated blanks; however, the initial or continuing calibration criteria for that compound may not have been met and would warrant qualification as an estimated result (J) or quantitation limit (UJ). In this particular case, the compound would be qualified as having an estimated quantitation limit (UJ). The (R) qualifier, which signifies that the result has been rejected, takes priority over all other qualifiers.

In some cases, there are multiple degrees to which the quality control criteria may not be met. For example, a matrix spike recovery for an inorganic analyte may be slightly greater than the upper limit of the Contract Required Recovery range; the corresponding positive results may be qualified as estimated (J). However, if the matrix spike recovery is greater than 150%, the positive results would be qualified as unusable (R). It should be noted that the discussions contained within Sections 2.0 through 5.0 explain where quality control was deficient. As specified in the functional guidelines, if the non-adherence to quality control criteria are slight, qualification of data may not be warranted. However, if the non-adherence is significant, qualification and possible rejection of the data may be necessary. The narrative discussion specifies where rejection of the data is necessary.

In general, the discussions which follow in Sections 2.0 through 5.0 describe only instances where the quality control criteria specified in the documents named above were not met. Tables H3 through H7 of this document summarize specific samples for which qualification occurred. This

report is intended to address the samples collected in support of the Investigation, except where an overlap has occurred (i.e., QC samples and dissolved Iron).

Following data validation and qualification, the analytical data and qualifiers for each sample point were summarized. Qualified results for the Investigation monitoring wells are provided in Appendix J of this report in a tabular format.

2.0 TARGET COMPOUND LIST VOLATILE ORGANIC PARAMETERS

Samples were collected from 10 groundwater monitoring wells. Additionally, two wells were sampled in duplicate and three trip blanks and rinsate blanks were collected for VOCs. The samples were separated into two SDGs which contain samples and field duplicates and one SDG which contained one rinsate blank, all of which were analyzed for VOCs using the CLP SOW dated 3/90. The two SDGs which contain the samples (i.e., 1 and 48) were validated in accordance with the functional guidelines.

Data Quality Objectives

Precision: Goals for laboratory and field precision were generally met, except where noted below.

Accuracy: Goals for accuracy were generally met, except where noted below.

Sample Result Verification: All sample results were supported in the raw data.

Detection Limits: The detection limit goals were achieved for all analyses, except where dilutions were required due to matrix problems.

Completeness: The data packages were complete for all requested analyses. Twelve (12) samples were validated in this data set. A total of 429 results for these samples were reported in which 429 were deemed valid. This results in a completeness of 100% for these samples which meets the Work Plan objective of 85%.

Major Deficiencies

There were no major deficiencies identified with VOCs.

Minor Deficiencies

Identified below are the minor deficiencies which required qualification of the data. Refer to Table H3 for the specific samples affected by each deficiency.

Volatile SDGs (1 and 48)

Laboratory preparation blanks, rinsate blanks and trip blanks are evaluated for target compound contamination. Methylene chloride, Acetone and Tetrachloroethene were found as contaminants in

various blanks for these SDGs. Samples associated with these blanks required qualification. For Methylene chloride and Acetone, an action limit of 10 times the concentration found in the blank was calculated. For Tetrachloroethene an action limit of 5 times the concentration found in the blank was calculated. For samples where any of these compounds were detected as a positive result between the Contract Required Quantitation Limit (CRQL) and the action limit, the result was flagged as undetected (U). For samples where any of these compounds were detected below the CRQL, the result was changed to the CRQL and qualified as undetected (U). Samples with positive results above the action limit did not require qualification.

The functional guidelines require the percent differences for the response factors (RRF) between the initial and continuing daily calibration be less than $\pm 25\%$. This criteria was not achieved for the compounds in the following continuing daily calibrations:

Sept 29, 1996	Chloromethane, Bromomethane, and Chloroethane;
Sept 30, 1996	Vinyl chloride; and
Sept. 24, 1996	Chloromethane, Bromomethane, Vinyl chloride, and Chloroethane.

The samples associated with these calibrations required qualification as estimated values (J) for positive results and estimated quantitation limits (UJ) for non-detected results.

The functional guidelines require the response factors remain stable over the concentration range of the initial calibration (i.e. less than $\pm 30\%$ RSD). This criterion was not achieved for the initial calibration analyzed on September 20, 1996 for Acetone. The samples associated with this initial calibration required qualification as estimated values (J) for positive results and estimated quantitation limits (UJ) for non-detected results.

3.0 TARGET COMPOUND LIST SEMI-VOLATILE ORGANIC PARAMETERS

Samples were collected from 10 groundwater monitoring wells. Additionally, two wells were sampled in duplicate and three rinsate blanks were collected for SVOCs. The samples were grouped into two SDGs (SDG 1 and 48) by the laboratory and analyzed for SVOCs using the SOW dated 3/90. The SDG was validated in accordance with the functional guidelines.

Data Quality Objectives

Precision: Goals for laboratory and field precision were generally met, except where noted below.

Accuracy: Goals for accuracy were generally met, except where noted below.

Sample Result Verification: All sample results were supported in the raw data.

Detection Limits: The detection limit goals were achieved for all analyses.

Completeness: The data packages were complete for all requested analyses. Twelve (12) samples were validated in this data set. A total of 832 results for these samples were reported in which 832 were deemed valid. This results in a completeness of 100% for these samples which meets the Work Plan objective of 85%.

Major Deficiencies

There were no major deficiencies identified for the SVOC analyses.

Minor Deficiencies

Identified below are the minor deficiencies which required qualification of the data. Refer to Table H4 for the specific samples affected by each deficiency.

SDG 48

The functional guidelines require the percent differences for the response factors between the initial and continuing daily calibration be less than $\pm 25\%$. This criteria was not achieved for the below listed compounds in the following continuing daily calibrations:

Oct 11, 1996 2,4-Dinitrophenol, 4-Nitrophenol, 4-Nitroaniline, Di-n-butylphthalate, Fluoranthene and Pyrene;

Oct. 11, 1996 4-Nitrophenol, Fluoranthene, 3,3'-Dichlorobenzidine, Di-n-octylphthalate.

The samples associated with these calibrations required qualification as estimated values (J) for positive results and estimated quantitation limits (UJ) for non-detected results.

During the data validation process, the qualitative identification of compounds are evaluated. The evaluations are based on mass spectra, retention time, peak shape and intensity. The laboratory is instructed by the SOW to report a compound as present even if all spectral criteria are not met. For the compound Pyrene in sample MW-14R, the mass spectra indicates that there is presumptive evidence of the presence of the compound, however, all criteria are not met. Since the compound is only presumed to be present in the sample, the result for this compound in the specified sample was qualified with the "N" flag.

4.0 TARGET COMPOUND LIST PESTICIDE/PCBS

Samples were collected from 10 groundwater monitoring wells. Additionally, two wells were sampled in duplicate and three rinsate blanks for Pesticides and Polychlorinated Biphenyls (PCBs). The samples were grouped into two SDGs by the laboratory and analyzed for Pesticides and PCBs using the SOW dated 3/90. Each SDG was validated in accordance with the functional guidelines and guidance from the USEPA Region II Quality Assurance Chemist.

Data Quality Objectives

Precision: Goals for laboratory and field precision were generally met, except where noted below.

Accuracy: Goals for accuracy were generally met, except where noted below.

Sample Result Verification: All sample results were supported in the raw data. Positive presence of a TCL pesticide/PCB must be confirmed by analysis on a dissimilar chromatographic column. Quantitation is performed for each column and the lower value is reported by the laboratory. The percent difference between the two results is calculated and reported by the laboratory.

Detection Limits: The detection limit goals were achieved for all analyses.

Completeness: The data packages were complete for all requested analyses. Twelve (12) samples were validated in this data set. A total of 364 results for these samples were reported in which 364 were deemed valid. This results in a completeness of 100% for these samples which meets the Work Plan objective of 85%.

Major Deficiencies

There were no major deficiencies which required rejection of the data.

Minor Deficiencies

Identified below are the minor deficiencies which required qualification of the data. Refer Table H5 for the specific samples affected by each deficiency.

SDG 48

The percent difference between the results reported from each GC column were greater than 25% but less than 70% for the compounds 4,4'-DDE and Endosulfan II in sample MW-15D. In accordance with the functional guidelines, compounds with percent differences greater than 25% but less than 70% were qualified as estimated values (J). Compounds with percent differences less than 25% did not require qualification.

Laboratory preparation blanks and rinsate blanks are evaluated for target compound contamination. Various pesticide compounds were found as contaminants in blanks in this SDG. Samples associated with these blanks required qualification. For all of these compounds, an action limit of 5 times the concentration found in the blank was calculated. Sample MW-15D required qualification as undetected result (U) for the compound beta-BHC.

5.0 METALS PARAMETERS

Unfiltered samples were collected from 10 monitoring wells and filtered samples (iron) were collected from 10 monitoring wells. Additionally, two wells were sampled in duplicate and three field rinsate blanks were collected. The unfiltered samples were analyzed for TAL metals and the filtered samples were analyzed for Iron. The sample results were separated into four SDGs (two for TAL and two for Iron) by the laboratory and analyzed using the SOW ILM03.0. Each SDG was validated in accordance with the functional guidelines. The laboratory used an axial "trace" ICP instrument for the analysis of all metals with the exception of mercury. Mercury was analyzed by a cold vapor analyzer. The use of axial "trace" ICP instrument yields lower instrument detection limits for most of the analytes previously analyzed using the conventional ICP instrumentation. Additionally, it allows for the analysis of Arsenic, Selenium, Thallium and Lead by ICP rather than Graphite Furnace Atomic Absorption (GFAA).

Data Quality Objectives

Precision: Goals for laboratory and field precision were generally met, except where noted below.

Accuracy: Goals for accuracy were generally met, except where noted below.

Sample Result Verification: All sample results were supported in the raw data.

Detection Limits: The detection limit goals were achieved for all analyses.

Completeness: The data packages were complete for all requested analyses. Twelve (12) unfiltered samples and 26 filtered samples were validated in this data set. A total of 312 results for unfiltered samples were reported in which 305 were deemed valid. A total of 26 results for filtered samples were reported in which 26 were deemed valid. This results in a completeness of 98% for unfiltered samples and 100% for filtered samples which meet the Work Plan objective of 85% for each.

Major Deficiencies

Identified below are the major deficiencies which required rejection of the data. Refer to the tables in Attachment H6 for the specific samples affected by each deficiency.

SDG 76M Unfiltered Metals

Laboratory preparation blanks and rinsate blanks are evaluated for target analyte contamination. Zinc was found as a contaminant in two of the rinsate blanks. Samples associated with these blanks required qualification. For Zinc, an action limit of 5 times the concentration found in the blank was calculated. For samples where Zinc was detected as a positive result between the IDL and the action limit, the result was flagged as rejected (R). Samples with a positive result above the action limit did not require qualification.

Minor Deficiencies

Identified below are the minor deficiencies which required qualification of the data. Refer to the tables in Attachment H6 for the specific samples affected by each deficiency.

SDG 3 - Unfiltered metals

The matrix spike recovery for Silver was lower than the criteria (75% - 125%) specified by the functional guidelines but greater than 30%. For the unfiltered portions of the affected samples, positive results were qualified as estimated values (J), and non-detects were qualified as estimated detection limit (UJ).

The functional guidelines require the absolute difference between the primary and field duplicate samples to be less than CRDL where the results are less than 5 times the CRDL. This criteria was not met for zinc in the associated field duplicate analysis. The positive results for this analyte for all samples in this SDG were qualified as estimated values (J).

SDG 76M

The recoveries of the CRDL standards for selenium were less than the lower control limit of less than 80% but greater than 50%. The positive results for this analyte for all samples in this SDG were qualified as estimated values (J), and non-detects were qualified as estimated detection limit (UJ).

SDG 3 and 76M

The functional guidelines require that a serial dilution be performed on any ICP elements which have concentrations equal to or greater than 10 times the IDL. Serial dilution analysis of the QC sample for these SDGs yielded a percent difference between the undiluted and diluted result for Potassium was greater than 10% but less than 100%. In accordance with the guidelines, positive

results greater than 10 times the IDL in the associated unfiltered samples were qualified as estimated values (J), and non-detects were qualified as estimated detection limit (UJ).

6.0 INORGANIC LIST PARAMETERS

Samples were collected from 10 groundwater monitoring wells at and adjacent to the Site. Additionally, two wells were sampled in duplicate and three rinsate blanks for the analysis of the inorganic list parameters. The sample results were presented in multiple reports by the laboratory. Each report was validated in accordance with method-specific criteria and the criteria specified in the QAPjP.

Data Quality Objectives

Precision: Goals for laboratory and field precision were generally met, except where noted below.

Accuracy: Goals for accuracy were generally met, except where noted below.

Sample Result Verification: All sample results were supported in the raw data.

Detection Limits: The detection limit goals were achieved for all analyses

Completeness: The data packages were complete for all requested analyses. Eleven (11) samples were validated in this data set. A total of 88 results for these samples were could have been reported in which 88 were deemed valid. The completeness for all analytes is 100% which meets the Work Plan objective of 85% for each parameter.

Major Deficiencies

There were no major deficiencies reported for the Inorganic List Parameters.

Minor Deficiencies

The matrix spike recovery for Nitrate-Nitrite was lower than the criteria (75% - 125%) specified by the QAPjP but greater than 30%. For the affected samples, positive results were qualified as estimated values (J) and non-detects were qualified as estimated detection limit (UJ).

Laboratory preparation blanks and rinsate blanks are evaluated for target analyte contamination. TOC was found as a contaminant in one of the rinsate blanks. Samples associated with this blank required qualification. For TOC, an action limit of 5 times the concentration found in the blank was calculated. For samples where TOC was detected as a positive result between the MDL and the

action limit, the result was flagged as Estimated value (J). Samples with a positive result above the action limit did not require qualification.

7.0 SUMMARY

Validation of the data collected for the Off-Property Investigation from the 216 Paterson Plank Road NPL Site was performed in accordance with USEPA Region II data validation guidelines, as applicable, and the criteria specified by the specific methods and the QAPjP.

Overall, the data required qualification due to some quality control criteria which were not achieved, but the majority of the data may be deemed usable in terms of objectives of the investigation. Although a positive result was qualified as estimated, the analyte should be considered present. Similarly, a non-detected result which was qualified as an estimated quantitation/detection limit should be considered not present for the purposes of this study, although the limit itself may not be precise. Rejected (unusable) data that are assigned the "R" qualifier should not be used. Rejected data have been included in the summary tables only for the purpose of completeness.

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**TABLE H1
SAMPLE POINT IDENTIFICATIONS**

		SDG NUMBERS				
SAMPLE POINT I. D.	DATE SAMPLED	ORGANICS	METALS, UNFILTERED	DISSOLVED IRON	INORGANICS LIST	CYANIDE
GROUNDWATER SAMPLES						
MW-8R	9/19/96	1	3	5	E14746	3
MW-10D	9/20/96	1	3	5	E14746	3
MW-10R	9/20/96	1	3	5	E14746	3
MW-11R	9/24/96	48	76M	81	E14821	76
MW-15D	9/24/96	48	76M	81	E14821	76
MW-16D	9/23/96	48	76M	81	E14820	76
MW-17D	9/19/96	1	3	5	E14746	3
MW-18D	9/19/96	1	3	5	E14746	3
MW-14D	9/23/96	48	76M	5	E14820	76
MW-14R	9/23/96	48	76M	5	E14820	76
PW-01	9/23/96	48	76M	NA	NA	76
QUALITY CONTROL SAMPLES						
TRIP BLANKS						
TB-03	9/19/96	1	NA	NA	NA	NA
TB-05	9/23/96	48	NA	NA	NA	NA
TB-06	9/24/96	48	NA	NA	NA	NA
RINSATE BLANKS						
RBGW-03	9/19/96	1	3	5	E14746	3
RBGW-05	9/23/96	48	76M	81	E14820	76
RBGW-06	9/24/96	48	76M	81	E14821	76
FIELD DUPLICATES						
MW-18DD	9/19/96	1	3	5	E14746	3
MW-14RD	9/23/96	48	76M	5	E14820	76
MATRIX SPIKE/MATRIX SPIKE DUPLICATES						
MW-11R	9/24/96	48	NA	81	E14821	NA
MW-14R	9/23/96	NA	76M	NA	E14820	76

NOTES:

NA = Not Sampled

TABLE H2
Data Qualifiers

Value - The data is acceptable; identification is confirmed.

- U - The analyte was tested for but was not detected. The associated numerical value is either the sample quantitation limit (organics) or the sample detection limit (inorganics).
- B - The analyte was detected at a concentration which is between the Instrument Detection Limit (IDL) and the Contract Required Detection Limit (CRDL). The data is acceptable.
- R - Reject data due to quality control criteria. The data are unusable (analyte may or may not be present in the sample).
- N - Tentative identification; consider analyte present.
- J - The analyte is present. The associated numerical value is an estimated quantity and may not be accurate or precise.
- UJ - The analyte was tested for but not detected. The sample quantitation limit or the sample detection limit is estimated and may be inaccurate or imprecise.

TABLE H3

DATE: November 18, 1996

PROJECT NO.: 943-6222

PROJECT NAME: 216 Paterson Plank Road NPL Site

ANALYSIS: TCL Volatiles

SAMPLE DELIVERY GROUP NUMBER: 1

REVIEWER: Jeffrey R. Hendel

DEFICIENCY	COMPOUND(S)	QUALIFIER	SAMPLES AFFECTED	
Blank contamination	Acetone	U	MW-10D	
RRF for initial calibration exceeds 30%.	Acetone	J for positive results UJ for non-detected results	All	
% difference between the initial and continuing RRFs exceeds 25%	Chloromethane, Bromomethane, Vinyl Chloride, Chloroethane	J for positive results UJ for non-detected results	MW-8R, MW-18DD, MW-10D,	MW-18D, MW-17D, MW-10R

SAMPLE DELIVERY GROUP NUMBER: 48

REVIEWER: Jeffrey R. Hendel

DEFICIENCY	COMPOUND(S)	QUALIFIER	SAMPLES AFFECTED	
Blank contamination	Acetone	U	MW-11R,	MW-15D
		(after changing result to CRQL)		
		U	PW-01, MW-14RD,	MW-14D, MW-16D,
	Methylene Chloride	U (after changing result to CRQL)	MW-14RD, MW-16D, MW-15D,	MW-11R, PW-01, MW-14R,
	Tetrachloroethene	U	MW-15D	
		(after changing result to CRQL)		
RRF for initial calibration exceeds 30%.	Acetone	J for positive results UJ for non-detected results	All	

TABLE H3 (continued)

SAMPLE DELIVERY GROUP NUMBER: 48

REVIEWER: Jeffrey R. Hendel

DEFICIENCY	COMPOUND(S)	QUALIFIER	SAMPLES AFFECTED
% difference between the initial and continuing RRFs exceeds 25%	Chloromethane, Vinyl Chloride	J for positive results UJ for non-detected results	MW-11R
	Chloromethane, Bromomethane, Chloroethane	J for positive results UJ for non-detected results	MW-14RD, MW-16D, MW-14D, MW-14R
	Vinyl Chloride	J for positive results UJ for non-detected results	MW-15D

TABLE H4

DATE: November 18, 1996

PROJECT NO.: 943-6222

PROJECT NAME: 216 Paterson Plank Road NPL Site

ANALYSIS: TCL Semi-Volatiles

SAMPLE DELIVERY GROUP NUMBER: 48

REVIEWER: Jeffrey R. Hendel

DEFICIENCY	COMPOUND(S)	QUALIFIER	SAMPLES AFFECTED
Presumptive evidence to the presence of the compound	Pyrene	N	MW-14R
% difference between the initial and continuing RRFs exceeds 25%	4-Nitrophenol, Fluoranthene, 3,3'-Dichlorobenzidine, Di-n-Octylphthalate	J for positive results UJ for non-detected results	PW-01
	2,4-Dinitrophenol, 4-Nitrophenol, 4-Nitroaniline, Pyrene, Di-n-Butylphthalate, Fluoranthene	J for positive results UJ for non-detected results	MW-11R

TABLE H5**DATE: November 18, 1996****PROJECT NO.: 943-6222****PROJECT NAME: 216 Paterson Plank Road NPL Site****ANALYSIS: TCL Pesticide/PCBs****SAMPLE DELIVERY GROUP NUMBER: 48****REVIEWER: Jeffrey R. Hendel**

DEFICIENCY	COMPOUND(S)	QUALIFIER	SAMPLES AFFECTED
Blank contamination	beta-BHC	U (after changing result to CRQL)	MW-15D
%D between concentrations reported on each GC column greater than 25% but less than 70%	4,4'-DDE, Endosulfan II	J	MW-15D

TABLE H6**DATE:** November 18, 1996**PROJECT NO.:** 943-6222**PROJECT NAME:** 216 Paterson Plank Road NPL Site**ANALYSIS:** TAL (unfiltered) Metals**SAMPLE DELIVERY GROUP NUMBER:** 3**REVIEWER:** Jeffrey R. Hendel

DEFICIENCY	ANALYTE(S)	QUALIFIER	SAMPLES AFFECTED
Matrix spike recovery less than 75% but greater than 30%	Silver	J for positive results UJ for non-detected results	ALL
Absolute difference between primary and field duplicates greater than CRDL when results of either is less than 5 times the CRDL	Zinc	J for positive results	ALL
Percent difference greater than 10% for Serial Dilution	Potassium	J for positive results >10 times the IDL UJ for non-detected results	ALL

SAMPLE DELIVERY GROUP NUMBER: 76M**REVIEWER:** Jeffrey R. Hendel

DEFICIENCY	ANALYTE(S)	QUALIFIER	SAMPLES AFFECTED
Recovery of CRDL standard less than 80% but greater than 50 %	Selenium	J for positive results UJ for non-detected results	ALL
Percent difference greater than 10% for Serial Dilution	Potassium	J for positive results >10 times the IDL UJ for non-detected results	ALL
Blank Contamination	Zinc	R when result less than action level	ALL

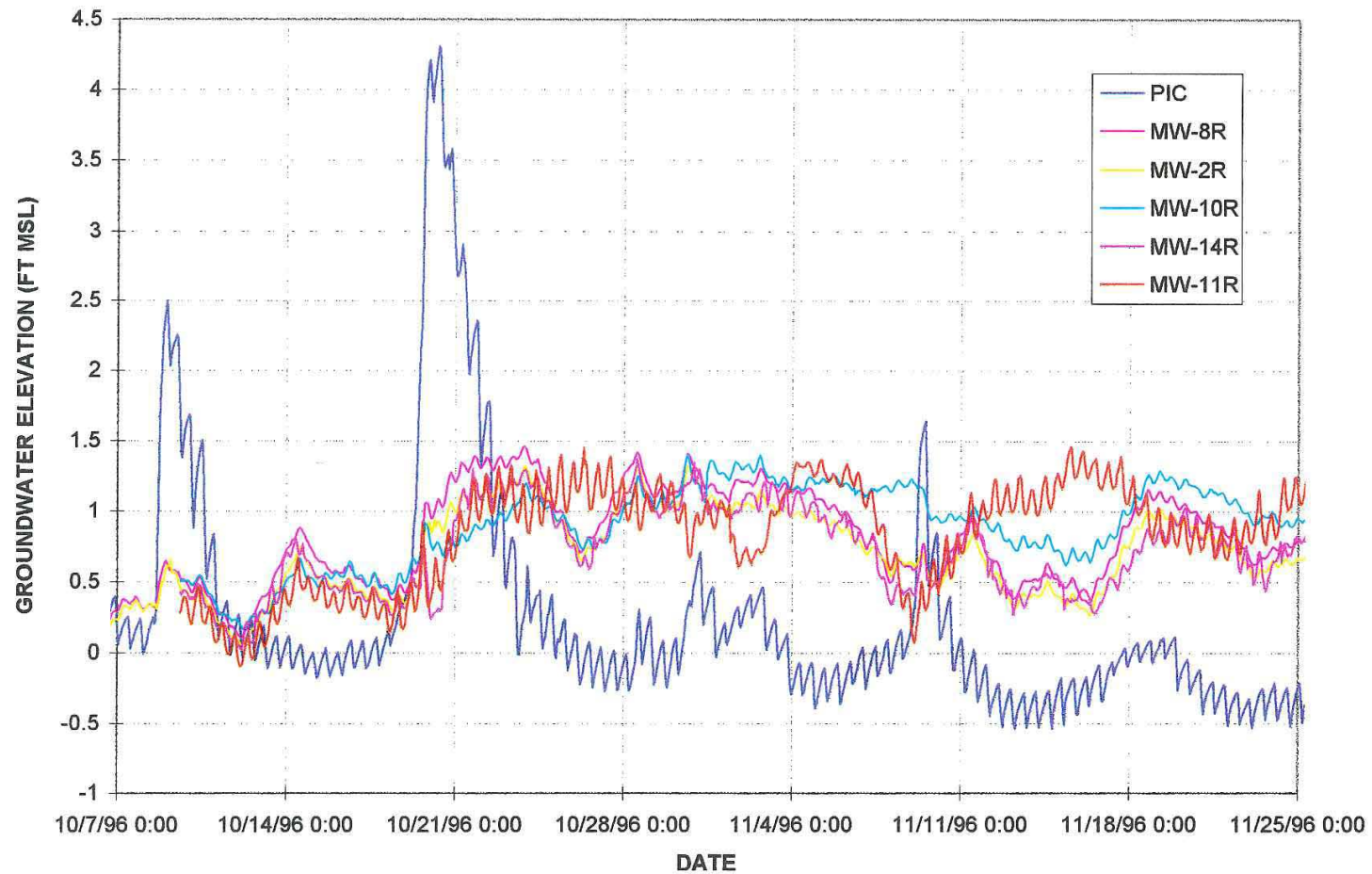
TABLE H7**DATE:** November 18, 1996**PROJECT NO.:** 943-6222**PROJECT NAME:** 216 Paterson Plank Road NPL Site**ANALYSIS:** Inorganic List Parameters**SAMPLE DELIVERY GROUP NUMBER:** N/A**REVIEWER:** Jeffrey R. Hendel

DEFICIENCY	ANALYTE(S)	QUALIFIER	SAMPLES AFFECTED	
Matrix spike recovery less than 75% but greater than 30%	Nitrate-Nitrite	J for positive results UJ for non-detected results	MW-11R, MW-14R, MW-16D, MW-11R,	MW-15D, MW-14D, MW-14RD, MW-15D
Blank Contamination	TOC	J for positive results	MW-16D, MW-11R, MW-14R,	MW-15D, MW-14D, MW-14RD

APPENDIX I
Water Level Monitoring

Till and Bedrock Monitoring Well Charts

**216 PATERSON PLANK ROAD SITE
GROUNDWATER ELEVATION vs TIME
BEDROCK MONITORING WELLS**

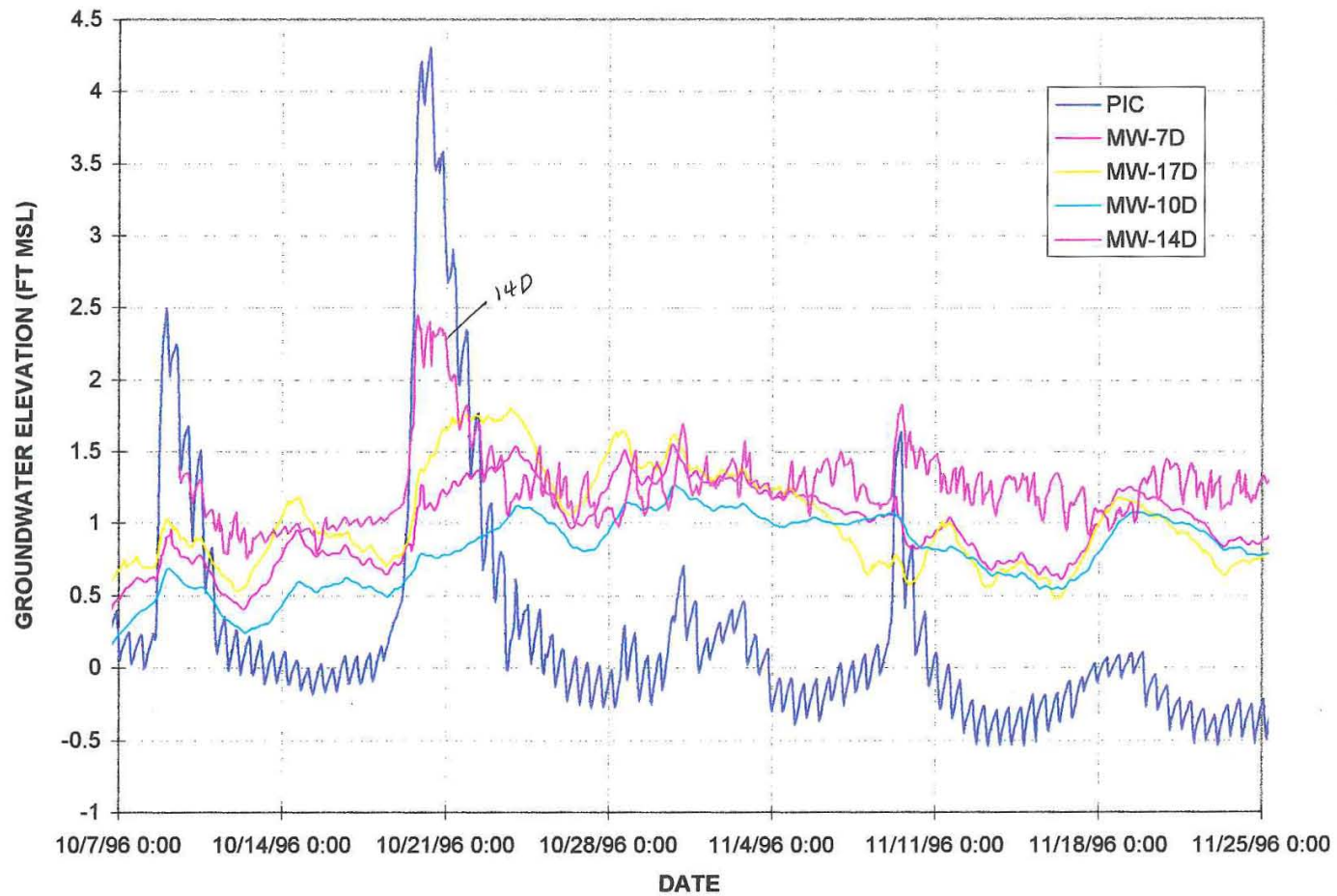


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216 PATERSON PLANK ROAD SITE
GROUNDWATER ELEVATION vs TIME
TILL MONITORING WELLS MW-7D, MW-10D, MW-14D, & MW-17D

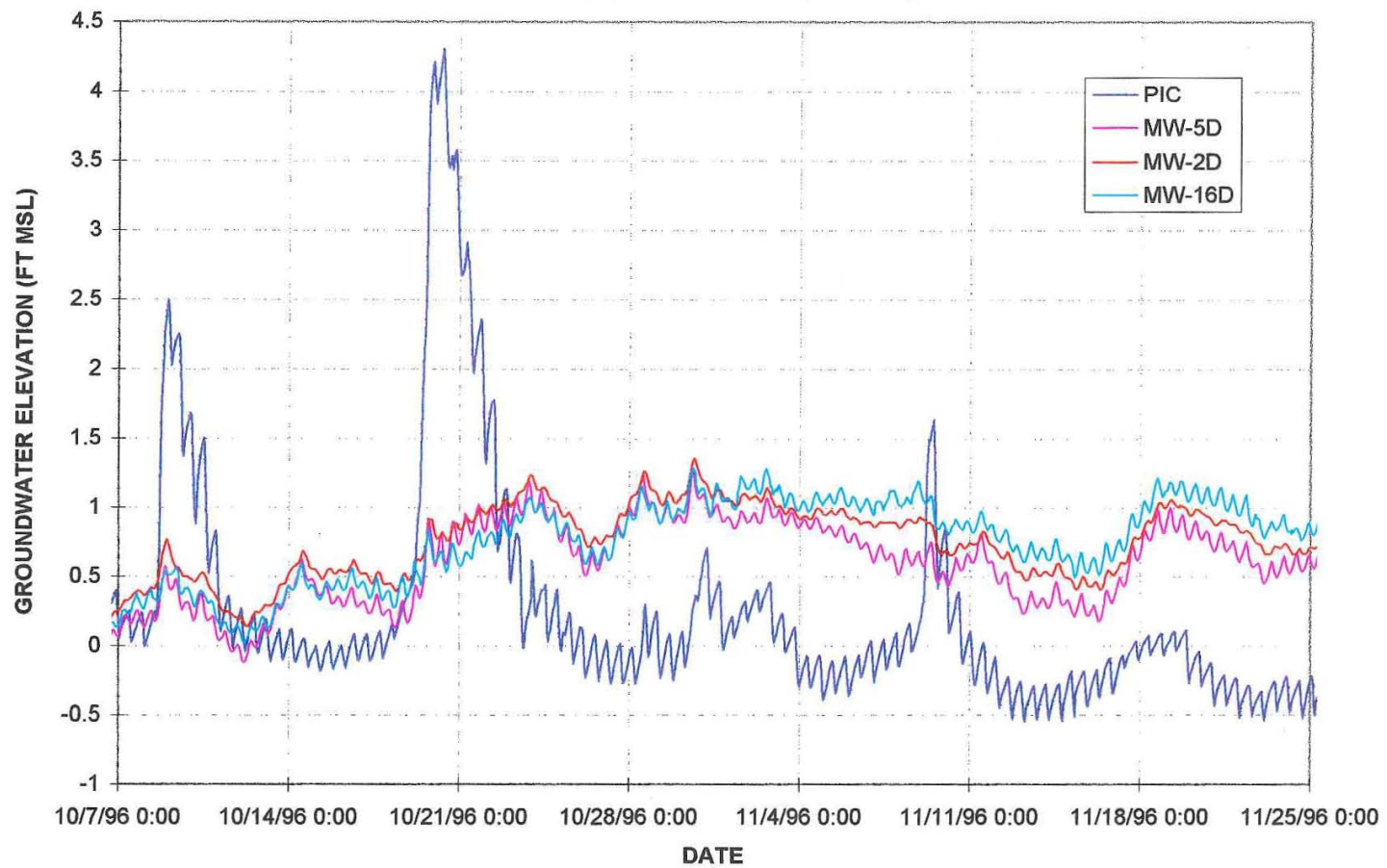


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Golder Associates

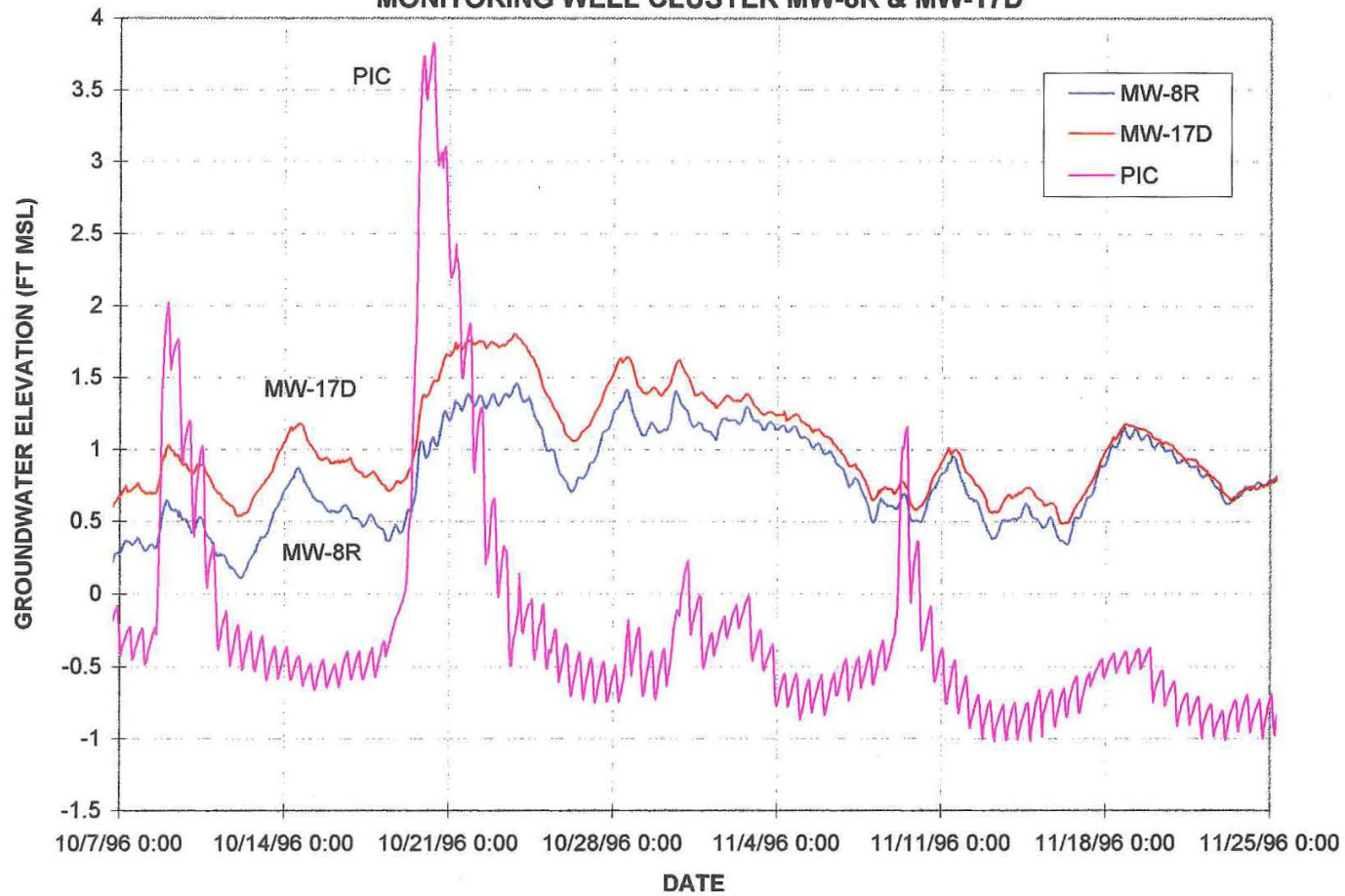
R2-0000615

**216 PATERSON PLANK ROAD SITE
GROUNDWATER ELEVATION vs TIME
TILL MONITORING WELLS MW-2D, MW-5D, & MW-16D**

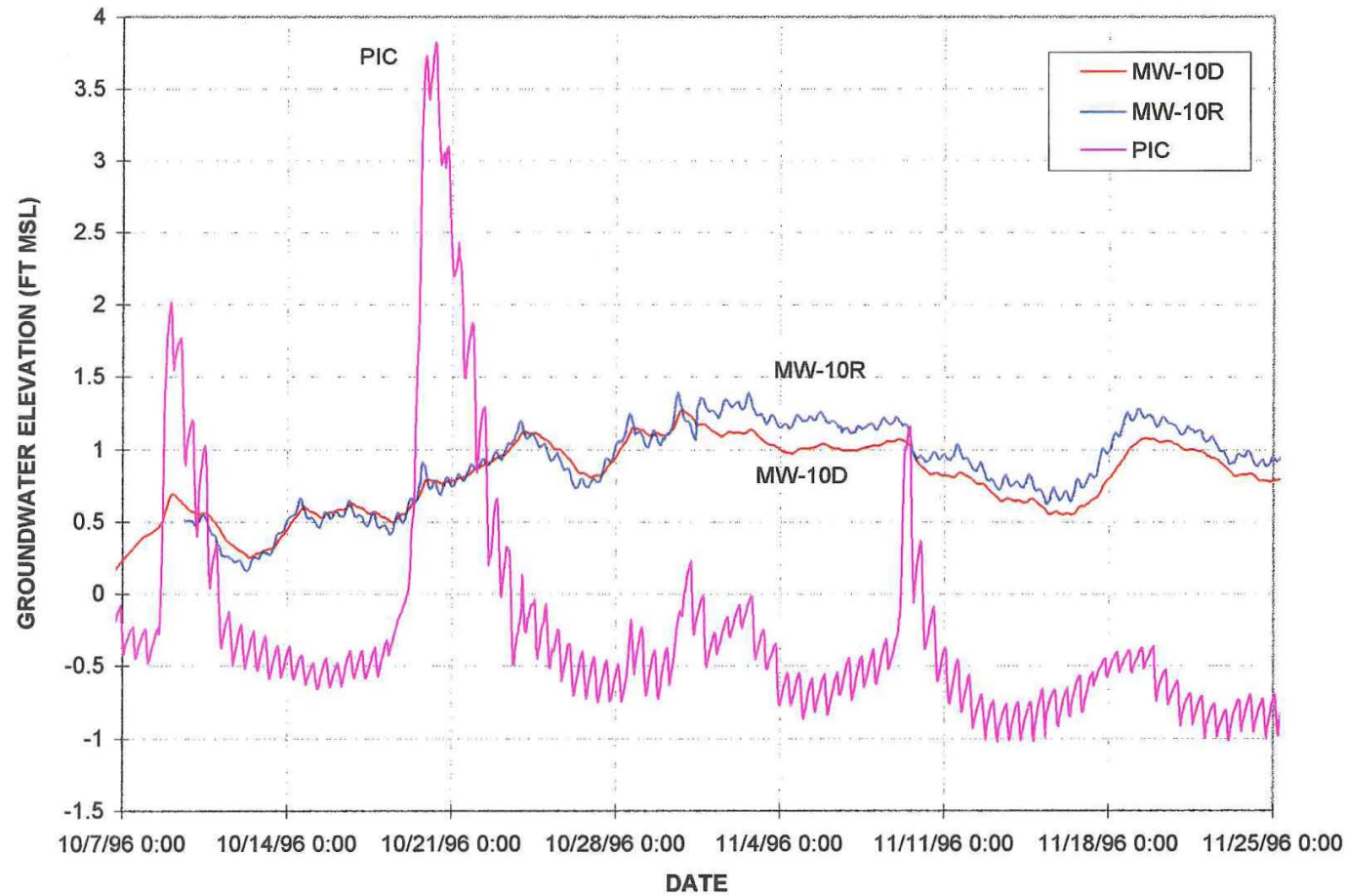


Monitoring Well Cluster Charts

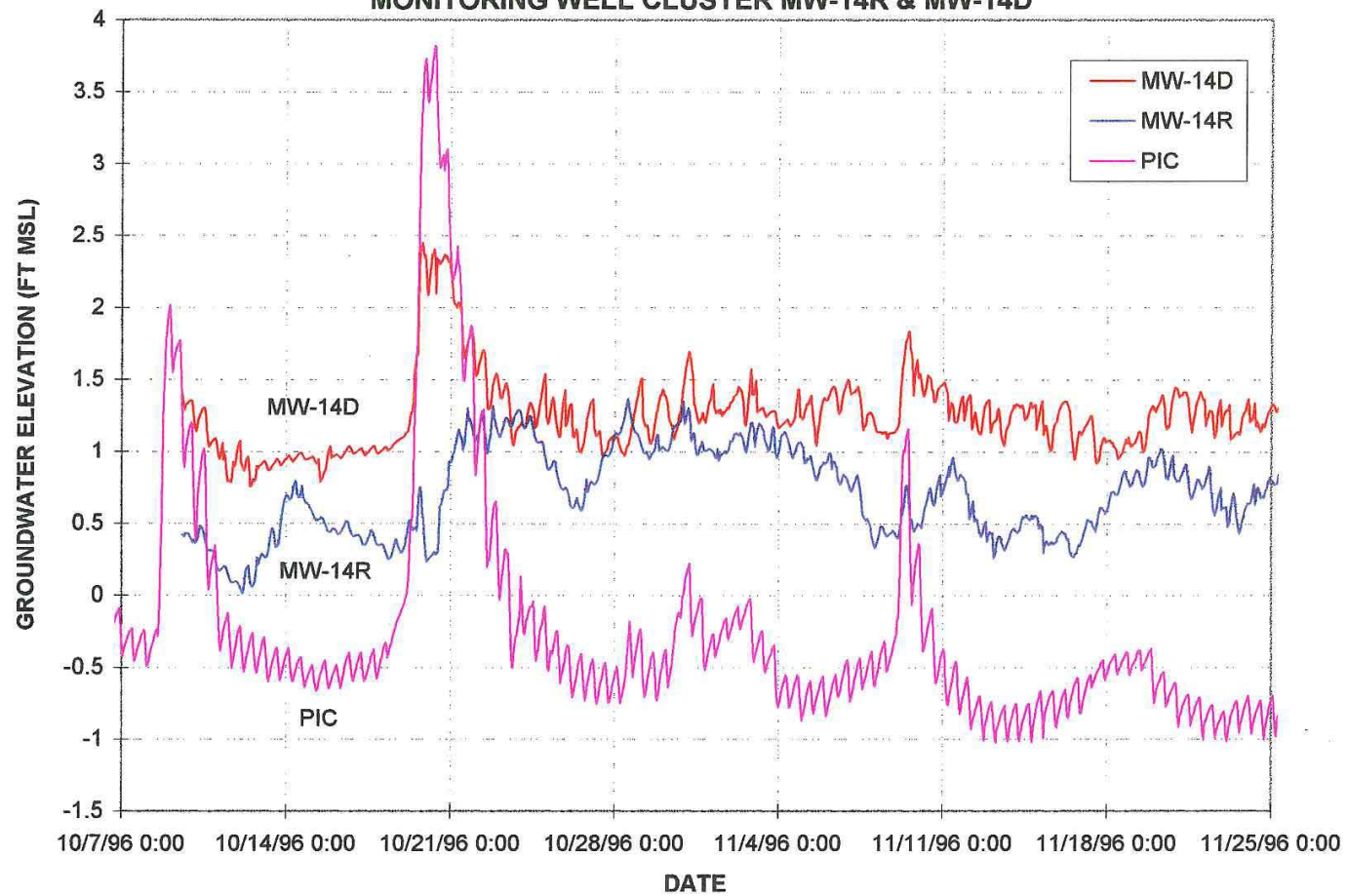
216 PATERSON PLANK ROAD SITE
GROUNDWATER ELEVATION vs TIME
MONITORING WELL CLUSTER MW-8R & MW-17D



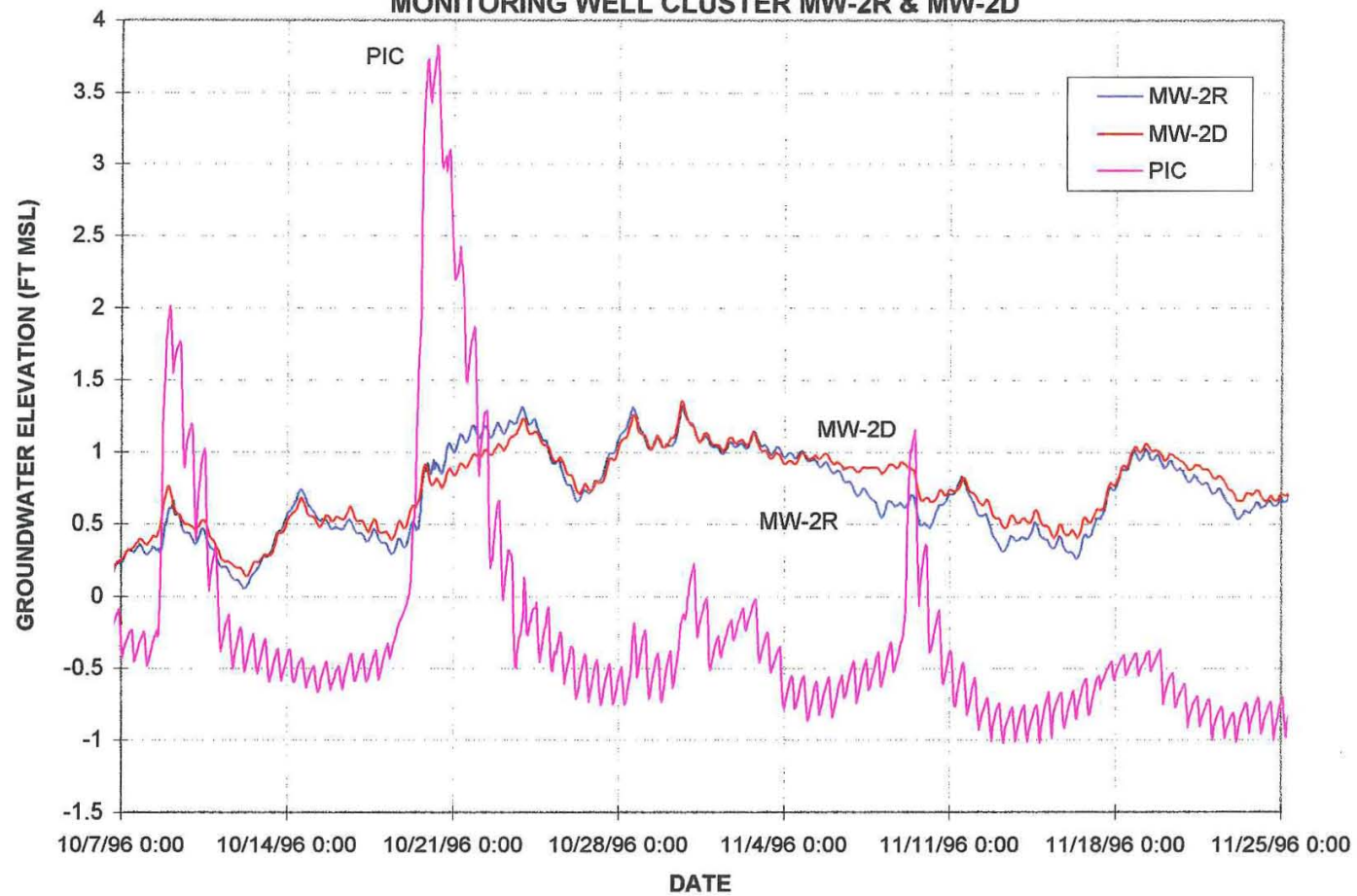
**216 PATERSON PLANK ROAD SITE
GROUNDWATER ELEVATION vs TIME
MONITORING WELL CLUSTER MW-10R & MW-10D**



216 PATERSON PLANK ROAD SITE
GROUNDWATER ELEVATION vs TIME
MONITORING WELL CLUSTER MW-14R & MW-14D



216 PATERSON PLANK ROAD SITE
GROUNDWATER ELEVATION vs TIME
MONITORING WELL CLUSTER MW-2R & MW-2D



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R2-0000621

APPENDIX J
Groundwater Chemistry Data

January, 1997

SUMMARY OF CLP OR CS ANALYSES
 216 Paterson Plank Road Site
 Sample Results
 Volatile Organics

943-6222

Matrix: Groundwater

CRQL	Parameter	Sample Point MW-08R			Sample Point MW-10D			Sample Point MW-10R			Sample Point MW-11R			Sample Point MW-14D		
		SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
10	Chloromethane	10	10	UJ	10	10	UJ	10	10	UJ	10	10	UJ	10	10	UJ
10	Bromomethane	10	10	UJ	10	10	UJ	10	10	UJ	10	10	U	10	10	UJ
10	Vinyl Chloride	10	10	UJ	10	10	UJ	10	10	UJ	10	10	UJ	10	10	U
10	Chloroethane	10	10	UJ	10	10	UJ	10	10	UJ	10	10	U	10	10	U
10	Methylene Chloride	10	10	U	10	10	U	10	1	J	10	10	U	10	10	U
10	Acetone	10	10	UJ	10	22	UJ	10	10	UJ	10	10	UJ	10	18	UJ
10	Carbon Disulfide	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,1-Dichloroethene	10	10	U	10	10	U	10	10	U	10	3	J	10	10	U
10	1,1-Dichloroethane	10	10	U	10	10	U	10	10	U	10	2	J	10	10	U
10	Total 1,2-Dichloroethene	10	10	U	10	10	U	10	10	U	10	24		10	10	U
10	Chloroform	10	5	J	10	3	J	10	7	J	10	10	J	10	5	J
10	1,2-Dichloroethane	10	10	U	10	10	U	10	10	U	10	9	J	10	10	U
10	2-Butanone	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,1,1-Trichloroethane	10	10	U	10	10	U	10	10	U	10	1	J	10	1	J
10	Carbon Tetrachloride	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Bromodichloromethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,2-Dichloropropane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	cis-1,3-Dichloropropene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Trichloroethene	10	10	U	10	10	U	10	10	U	10	56		10	45	
10	Dibromochloromethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,1,2-Trichloroethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	trans-1,3-Dichloropropene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Bromoform	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Methyl-2-Pentanone	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2-Hexanone	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Tetrachloroethene	10	10	U	10	10	U	10	10	U	10	50		10	2	J
10	Toluene	10	3	J	10	10	U	10	10	U	10	10	U	10	2	J
10	1,1,2,2-Tetrachloroethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Chlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Ethylbenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	2	J
10	Styrene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Total Xylenes	10	10	UJ	10	10	U	10	10	U	10	10	U	10	8	J

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

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Golder Associates

1 of 3

R2-0000623

January 1997

SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Volatile Organics

Matrix: Groundwater

		Sample Point MW-14R			Sample Point MW-14RD			Sample Point MW-15D			Sample Point MW-16D			Sample Point MW-17D		
		Date Sampled: 9/23/96			Date Sampled: 9/23/96			Date Sampled: 9/24/96			Date Sampled: 9/23/96			Date Sampled: 9/19/96		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0		
		Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %		
CRQL	Parameter	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
10	Chloromethane	10	10	UJ	10	10	UJ	10	10	U	10	10	UJ	10	10	UJ
10	Bromomethane	10	10	UJ	10	10	UJ	10	10	U	10	10	UJ	10	10	UJ
10	Vinyl Chloride	10	10	U	10	10	U	10	10	UJ	10	10	U	10	10	UJ
10	Chloroethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	UJ
10	Methylene Chloride	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Acetone	10	10	UJ	10	13	UJ	10	10	UJ	10	190	UJ	10	10	UJ
10	Carbon Disulfide	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,1-Dichloroethene	10	10	U	10	10	U	10	10	U	10	6	J	10	10	U
10	1,1-Dichloroethane	10	10	U	10	10	U	10	10	U	10	3	J	10	10	U
10	Total 1,2-Dichloroethene	10	10	U	10	10	U	10	10	U	10	30		10	10	U
10	Chloroform	10	10	U	10	10	U	10	10	U	10	1	J	10	10	U
10	1,2-Dichloroethane	10	10	U	10	10	U	10	10	U	10	11		10	10	U
10	2-Butanone	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,1,1-Trichloroethane	10	10	U	10	10	U	10	10	U	10	3	J	10	10	U
10	Carbon Tetrachloride	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Bromodichloromethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,2-Dichloropropane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	cis-1,3-Dichloropropene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Trichloroethene	10	1	J	10	10	U	10	10	U	10	76		10	10	U
10	Dibromochloromethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,1,2-Trichloroethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	trans-1,3-Dichloropropene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Bromoform	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Methyl-2-Pentanone	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2-Hexanone	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Tetrachloroethene	10	10	U	10	10	U	10	10	U	10	21		10	10	U
10	Toluene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,1,2,2-Tetrachloroethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Chlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Ethylbenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Styrene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Total Xylenes	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

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R2-0000624

January 97

SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Volatile Organics

Matrix: Groundwater

		Sample Point MW-18D			Sample Point MW-18DD			Sample Point PW-01			Sample Point			Sample Point		
		Date Sampled: 9/19/96			Date Sampled: 9/19/96			Date Sampled: 9/23/96			Date Sampled:			Date Sampled:		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor:			Dilution Factor:		
		Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %			Percent Solid: %			Percent Solid: %		
CRQL	Parameter	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
10	Chloromethane	10	10	UJ	10	10	UJ	10	10	U						
10	Bromomethane	10	10	UJ	10	10	UJ	10	10	U						
10	Vinyl Chloride	10	10	UJ	10	10	UJ	10	10	U						
10	Chloroethane	10	10	UJ	10	10	UJ	10	10	U						
10	Methylene Chloride	10	1	J	10	1	J	10	10	U						
10	Acetone	10	10	UJ	10	10	UJ	10	12	UJ						
10	Carbon Disulfide	10	10	U	10	10	U	10	10	U						
10	1,1-Dichloroethene	10	10	U	10	10	U	10	10	U						
10	1,1-Dichloroethane	10	10	U	10	10	U	10	10	U						
10	Total 1,2-Dichloroethene	10	10	U	10	10	U	10	10	U						
10	Chloroform	10	10	U	10	10	U	10	23							
10	1,2-Dichloroethane	10	10	U	10	10	U	10	10	U						
10	2-Butanone	10	10	U	10	10	U	10	10	U						
10	1,1,1-Trichloroethane	10	10	U	10	10	U	10	10	U						
10	Carbon Tetrachloride	10	10	U	10	10	U	10	10	U						
10	Bromodichloromethane	10	10	U	10	10	U	10	11							
10	1,2-Dichloropropane	10	10	U	10	10	U	10	10	U						
10	cis-1,3-Dichloropropene	10	10	U	10	10	U	10	10	U						
10	Trichloroethene	10	10	U	10	10	U	10	10	U						
10	Dibromochloromethane	10	10	U	10	10	U	10	4	J						
10	1,1,2-Trichloroethane	10	10	U	10	10	U	10	10	U						
10	Benzene	10	10	U	10	10	U	10	10	U						
10	trans-1,3-Dichloropropene	10	10	U	10	10	U	10	10	U						
10	Bromoform	10	10	U	10	10	U	10	10	U						
10	4-Methyl-2-Pentanone	10	10	U	10	10	U	10	10	U						
10	2-Hexanone	10	10	U	10	10	U	10	10	U						
10	Tetrachloroethene	10	10	U	10	10	U	10	10	U						
10	Toluene	10	10	U	10	10	U	10	10	U						
10	1,1,2,2-Tetrachloroethane	10	10	U	10	10	U	10	10	U						
10	Chlorobenzene	10	10	U	10	10	U	10	10	U						
10	Ethylbenzene	10	10	U	10	10	U	10	10	U						
10	Styrene	10	10	U	10	10	U	10	10	U						
10	Total Xylenes	10	10	U	10	10	U	10	10	U						

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

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SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Matrix: Groundwater

Semivolatile Organics

		Sample Point MW-08R			Sample Point MW-10D			Sample Point MW-10R			Sample Point MW-11R			Sample Point MW-14D		
		Date Sampled: 9/19/96			Date Sampled: 9/20/96			Date Sampled: 9/20/96			Date Sampled: 9/24/96			Date Sampled: 9/23/96		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0		
		Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %		
CRQL	Parameter	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
10	Phenol	10	10	U	10	10	U	10	10	U	10	19	U	10	10	U
10	bis(2-Chloroethyl)ether	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2-Chlorophenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,3-Dichlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,4-Dichlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,2-Dichlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2-Methylphenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,2'-Oxybis(1-Chloropropane)	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Methylphenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	N-Nitroso-di-n-propylamine	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Hexachloroethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Nitrobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Isophorone	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2-Nitrophenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,4-Dimethylphenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	bis(2-Chloroethoxy)Methane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,4-Dichlorophenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,2,4-Trichlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Naphthalene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Chloroaniline	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Hexachlorobutadiene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Chloro-3-Methylphenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2-Methylnaphthalene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Hexachlorocyclopentadiene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,4,6-Trichlorophenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	2,4,5-Trichlorophenol	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
10	2-Chloronaphthalene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	2-Nitroaniline	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
10	Dimethyl Phthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Acenaphthylene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,6-Dinitrotoluene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	3-Nitroaniline	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
10	Acenaphthene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

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January 1997

SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Matrix: Groundwater

Semivolatile Organics

		Sample Point MW-08R			Sample Point MW-10D			Sample Point MW-10R			Sample Point MW-11R			Sample Point MW-14D		
		Date Sampled: 9/19/96			Date Sampled: 9/20/96			Date Sampled: 9/20/96			Date Sampled: 9/24/96			Date Sampled: 9/23/96		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0		
		Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %		
CRQL	Parameter	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
10	Dibenzofuran	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,4-Dinitrotoluene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Diethylphthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Chlorophenyl-phenylether	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Fluorene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	4-Nitroaniline	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
25	4,6-Dinitro-2-methylphenol	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
10	N-Nitrosodiphenylamine	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Bromophenyl-phenylether	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Hexachlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	Pentachlorophenol	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
10	Phenanthrene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Anthracene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Carbazole	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Di-n-butylphthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Fluoranthene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Pyrene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Butylbenzylphthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	3,3'-Dichlorobenzidine	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzo(a)Anthracene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Chrysene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	bis(2-Ethylhexyl)Phthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Di-n-Octyl Phthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzo(b)Fluoranthene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzo(k)Fluoranthene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzo(a)Pyrene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Indeno(1,2,3-cd)Pyrene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Dibenz(a,h)Anthracene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzo(g,h,i)Perylene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

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January 1997

SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Matrix: Groundwater

Semivolatile Organics

CRQL	Parameter	Sample Point MW-14R			Sample Point MW-14RD			Sample Point MW-15D			Sample Point MW-16D			Sample Point MW-17D		
		Date Sampled: 9/23/96			Date Sampled: 9/23/96			Date Sampled: 9/24/96			Date Sampled: 9/23/96			Date Sampled: 9/19/96		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0		
		Percent Solid:	NA %		Percent Solid:	NA %		Percent Solid:	NA %		Percent Solid:	NA %		Percent Solid:	NA %	
		SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
10	Phenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	bis(2-Chloroethyl)ether	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2-Chlorophenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,3-Dichlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,4-Dichlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,2-Dichlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2-Methylphenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,2'-Oxybis(1-Chloropropane)	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Methylphenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	N-Nitroso-di-n-propylamine	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Hexachloroethane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Nitrobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Isophorone	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2-Nitrophenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,4-Dimethylphenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	bis(2-Chloroethoxy)Methane	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,4-Dichlorophenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	1,2,4-Trichlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Naphthalene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Chloroaniline	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Hexachlorobutadiene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Chloro-3-Methylphenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2-Methylnaphthalene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Hexachlorocyclopentadiene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,4,6-Trichlorophenol	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	2,4,5-Trichlorophenol	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
10	2-Chloronaphthalene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	2-Nitroaniline	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
10	Dimethyl Phthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Acenaphthylene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,6-Dinitrotoluene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	3-Nitroaniline	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
10	Acenaphthene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	2,4-Dinitrophenol	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
25	4-Nitrophenol	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

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January 1997

SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Matrix: Groundwater

Semivolatile Organics

CRQL	Parameter	Sample Point MW-14R			Sample Point MW-14RD			Sample Point MW-15D			Sample Point MW-16D			Sample Point MW-17D		
		Date Sampled: 9/23/96			Date Sampled: 9/23/96			Date Sampled: 9/24/96			Date Sampled: 9/23/96			Date Sampled: 9/19/96		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0		
		Percent Solid:	NA	%	Percent Solid:	NA	%	Percent Solid:	NA	%	Percent Solid:	NA	%	Percent Solid:	NA	%
		SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
10	Dibenzofuran	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	2,4-Dinitrotoluene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Diethylphthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Chlorophenyl-phenylether	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Fluorene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	4-Nitroaniline	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
25	4,6-Dinitro-2-methylphenol	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
10	N-Nitrosodiphenylamine	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	4-Bromophenyl-phenylether	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Hexachlorobenzene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
25	Pentachlorophenol	25	25	U	25	25	U	25	25	U	25	25	U	25	25	U
10	Phenanthrene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Anthracene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Carbazole	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Di-n-butylphthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Fluoranthene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Pyrene	10	1	JN	10	10	U	10	10	U	10	10	U	10	10	U
10	Butylbenzylphthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	3,3'-Dichlorobenzidine	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzo(a)Anthracene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Chrysene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	bis(2-Ethylhexyl)Phthalate	10	10	U	10	10	U	10	10	U	10	1	J	10	10	U
10	Di-n-Octyl Phthalate	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzo(b)Fluoranthene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzo(k)Fluoranthene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzo(a)Pyrene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Indeno(1,2,3-cd)Pyrene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Dibenz(a,h)Anthracene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U
10	Benzo(g,h,i)Perylene	10	10	U	10	10	U	10	10	U	10	10	U	10	10	U

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

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R2-0000629

January 1997

SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Matrix: Groundwater

Semivolatile Organics

CRQL	Parameter	Sample Point MW-18D			Sample Point MW-18DD			Sample Point PW-01			Sample Point			Sample Point		
		Date Sampled: 9/19/96			Date Sampled: 9/19/96			Date Sampled: 9/23/96			Date Sampled:			Date Sampled:		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor:			Dilution Factor:		
		Percent Solid:	NA %		Percent Solid:	NA %		Percent Solid:	NA %		Percent Solid:	%		Percent Solid:	%	
		SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
10	Phenol	10	10	U	10	10	U	10	10	U						
10	bis(2-Chloroethyl)ether	10	10	U	10	10	U	10	10	U						
10	2-Chlorophenol	10	10	U	10	10	U	10	10	U						
10	1,3-Dichlorobenzene	10	10	U	10	10	U	10	10	U						
10	1,4-Dichlorobenzene	10	10	U	10	10	U	10	10	U						
10	1,2-Dichlorobenzene	10	10	U	10	10	U	10	10	U						
10	2-Methylphenol	10	10	U	10	10	U	10	10	U						
10	2,2'-Oxybis(1-Chloropropane)	10	10	U	10	10	U	10	10	U						
10	4-Methylphenol	10	10	U	10	10	U	10	10	U						
10	N-Nitroso-di-n-propylamine	10	10	U	10	10	U	10	10	U						
10	Hexachloroethane	10	10	U	10	10	U	10	10	U						
10	Nitrobenzene	10	10	U	10	10	U	10	10	U						
10	Isophorone	10	10	U	10	10	U	10	10	U						
10	2-Nitrophenol	10	10	U	10	10	U	10	10	U						
10	2,4-Dimethylphenol	10	10	U	10	10	U	10	10	U						
10	bis(2-Chloroethoxy)Methane	10	10	U	10	10	U	10	10	U						
10	2,4-Dichlorophenol	10	10	U	10	10	U	10	10	U						
10	1,2,4-Trichlorobenzene	10	10	U	10	10	U	10	10	U						
10	Naphthalene	10	10	U	10	10	U	10	10	U						
10	4-Chloroaniline	10	10	U	10	10	U	10	10	U						
10	Hexachlorobutadiene	10	10	U	10	10	U	10	10	U						
10	4-Chloro-3-Methylphenol	10	10	U	10	10	U	10	10	U						
10	2-Methylnaphthalene	10	10	U	10	10	U	10	10	U						
10	Hexachlorocyclopentadiene	10	10	U	10	10	U	10	10	U						
10	2,4,6-Trichlorophenol	10	10	U	10	10	U	10	10	U						
25	2,4,5-Trichlorophenol	25	25	U	25	25	U	25	25	U						
10	2-Chloronaphthalene	10	10	U	10	10	U	10	10	U						
25	2-Nitroaniline	25	25	U	25	25	U	25	25	U						
10	Dimethyl Phthalate	10	10	U	10	10	U	10	10	U						
10	Acenaphthylene	10	10	U	10	10	U	10	10	U						
10	2,6-Dinitrotoluene	10	10	U	10	10	U	10	10	U						
25	3-Nitroaniline	25	25	U	25	25	U	25	25	U						
10	Acenaphthene	10	10	U	10	10	U	10	10	U						
25	2,4-Dinitrophenol	25	25	U	25	25	U	25	25	U						
25	4-Nitrophenol	25	25	U	25	25	U	25	25	U						

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

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January 1997

SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Matrix: Groundwater

Semivolatile Organics

CRQL	Parameter	Sample Point MW-18D			Sample Point MW-18DD			Sample Point PW-01			Sample Point			Sample Point		
		Date Sampled: 9/19/96			Date Sampled: 9/19/96			Date Sampled: 9/23/96			Date Sampled:			Date Sampled:		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor:			Dilution Factor:		
		Percent Solid:	NA	%	Percent Solid:	NA	%	Percent Solid:	NA	%	Percent Solid:	%		Percent Solid:	%	
		SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
10	Dibenzofuran	10	10	U	10	10	U	10	10	U						
10	2,4-Dinitrotoluene	10	10	U	10	10	U	10	10	U						
10	Diethylphthalate	10	10	U	10	10	U	10	10	U						
10	4-Chlorophenyl-phenylether	10	10	U	10	10	U	10	10	U						
10	Fluorene	10	10	U	10	10	U	10	10	U						
25	4-Nitroaniline	25	25	U	25	25	U	25	25	U						
25	4,6-Dinitro-2-methylphenol	25	25	U	25	25	U	25	25	U						
10	N-Nitrosodiphenylamine	10	10	U	10	10	U	10	10	U						
10	4-Bromophenyl-phenylether	10	10	U	10	10	U	10	10	U						
10	Hexachlorobenzene	10	10	U	10	10	U	10	10	U						
25	Pentachlorophenol	25	25	U	25	25	U	25	25	U						
10	Phenanthrene	10	10	U	10	10	U	10	10	U						
10	Anthracene	10	10	U	10	10	U	10	10	U						
10	Carbazole	10	10	U	10	10	U	10	10	U						
10	Di-n-butylphthalate	10	10	U	10	10	U	10	10	U						
10	Fluoranthene	10	10	U	10	10	U	10	10	U						
10	Pyrene	10	10	U	10	10	U	10	10	U						
10	Butylbenzylphthalate	10	10	U	10	10	U	10	10	U						
10	3,3'-Dichlorobenzidine	10	10	U	10	10	U	10	10	U						
10	Benzo(a)Anthracene	10	10	U	10	10	U	10	10	U						
10	Chrysene	10	10	U	10	10	U	10	10	U						
10	bis(2-Ethylhexyl)Phthalate	10	10	U	10	10	U	10	10	U						
10	Di-n-Octyl Phthalate	10	10	U	10	10	U	10	10	U						
10	Benzo(b)Fluoranthene	10	10	U	10	10	U	10	10	U						
10	Benzo(k)Fluoranthene	10	10	U	10	10	U	10	10	U						
10	Benzo(a)Pyrene	10	10	U	10	10	U	10	10	U						
10	Indeno(1,2,3-cd)Pyrene	10	10	U	10	10	U	10	10	U						
10	Dibenz(a,h)Anthracene	10	10	U	10	10	U	10	10	U						
10	Benzo(g,h,i)Perylene	10	10	U	10	10	U	10	10	U						

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

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R2-0000631

January 1997

SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Pesticides / PCBs

Matrix: Groundwater

CRQL	Parameter	Sample Point MW-08R			Sample Point MW-10D			Sample Point MW-10R			Sample Point MW-11R			Sample Point MW-14D		
		Date Sampled: 9/19/96			Date Sampled: 9/20/96			Date Sampled: 9/20/96			Date Sampled: 9/24/96			Date Sampled: 9/23/96		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0		
		SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
0.05	alpha-BHC	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U
0.05	beta-BHC	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U
0.05	delta-BHC	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U
0.05	gamma-BHC (Lindane)	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U
0.05	Heptachlor	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U
0.05	Aldrin	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U
0.05	Heptachlor Epoxide	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U
0.05	Endosulfan I	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U
0.1	Dieldrin	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	4,4'-DDE	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	Endrin	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	Endosulfan II	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	4,4'-DDD	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	Endosulfan Sulfate	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	4,4'-DDT	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.5	Methoxychlor	0.5	0.5	U	0.5	0.5	U	0.5	0.5	U	0.5	0.5	U	0.5	0.5	U
0.1	Endrin Ketone	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	Endrin Aldehyde	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.05	alpha-Chlordane	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U
0.05	gamma-Chlordane	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U
5	Toxaphene	5	5	U	5	5	U	5	5	U	5	5	U	5	5	U
1	Aroclor-1016	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U
2	Aroclor-1221	2	2	U	2	2	U	2	2	U	2	2	U	2	2	U
1	Aroclor-1232	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U
1	Aroclor-1242	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U
1	Aroclor-1248	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U
1	Aroclor-1254	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U
1	Aroclor-1260	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

January 1997

SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results
Pesticides / PCBs

Matrix: Groundwater

CRQL	Parameter	Sample Point MW-14R			Sample Point MW-14RD			Sample Point MW-15D			Sample Point MW-16D			Sample Point MW-17D		
		SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
		Date Sampled: 9/23/96			Date Sampled: 9/23/96			Date Sampled: 9/24/96			Date Sampled: 9/23/96			Date Sampled: 9/19/96		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0		
		Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %		
0.05	alpha-BHC	0.05	0.05	U	0.05	0.05	U	0.05	0.051	U	0.05	0.05	U	0.05	0.05	U
0.05	beta-BHC	0.05	0.05	U	0.05	0.05	U	0.05	0.022	U	0.05	0.05	U	0.05	0.05	U
0.05	delta-BHC	0.05	0.05	U	0.05	0.05	U	0.05	0.051	U	0.05	0.05	U	0.05	0.05	U
0.05	gamma-BHC (Lindane)	0.05	0.05	U	0.05	0.05	U	0.05	0.051	U	0.05	0.05	U	0.05	0.05	U
0.05	Heptachlor	0.05	0.05	U	0.05	0.05	U	0.05	0.051	U	0.05	0.05	U	0.05	0.05	U
0.05	Aldrin	0.05	0.05	U	0.05	0.05	U	0.05	0.051	U	0.05	0.05	U	0.05	0.05	U
0.05	Heptachlor Epoxide	0.05	0.05	U	0.05	0.05	U	0.05	0.051	U	0.05	0.05	U	0.05	0.05	U
0.05	Endosulfan I	0.05	0.05	U	0.05	0.05	U	0.05	0.051	U	0.05	0.05	U	0.05	0.05	U
0.1	Dieldrin	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	4,4'-DDE	0.1	0.1	U	0.1	0.1	U	0.1	0.1	J	0.1	0.1	U	0.1	0.1	U
0.1	Endrin	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	Endosulfan II	0.1	0.1	U	0.1	0.1	U	0.1	0.1	J	0.1	0.1	U	0.1	0.1	U
0.1	4,4'-DDD	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	Endosulfan Sulfate	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	4,4'-DDT	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.5	Methoxychlor	0.5	0.5	U	0.5	0.5	U	0.5	0.51	U	0.5	0.5	U	0.5	0.5	U
0.1	Endrin Ketone	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U
0.1	Endrin Aldehyde	0.1	0.1	U	0.1	0.1	U	0.1	0.013	J	0.1	0.1	U	0.1	0.1	U
0.05	alpha-Chlordane	0.05	0.05	U	0.05	0.05	U	0.05	0.051	U	0.05	0.05	U	0.05	0.05	U
0.05	gamma-Chlordane	0.05	0.05	U	0.05	0.05	U	0.05	0.051	U	0.05	0.05	U	0.05	0.05	U
5	Toxaphene	5	5	U	5	5	U	5	5.1	U	5	5	U	5	5	U
1	Aroclor-1016	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U
2	Aroclor-1221	2	2	U	2	2	U	2	2	U	2	2	U	2	2	U
1	Aroclor-1232	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U
1	Aroclor-1242	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U
1	Aroclor-1248	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U
1	Aroclor-1254	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U
1	Aroclor-1260	1	1	U	1	1	U	1	1	U	1	1	U	1	1	U

Notes:

All units are pg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

R2-0000633

January 1997

SUMMARY OF CLP ORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Pesticides / PCBs

Matrix: Groundwater

		Sample Point MW-18D			Sample Point MW-18DD			Sample Point PW-01			Sample Point			Sample Point		
		Date Sampled: 9/19/96			Date Sampled: 9/19/96			Date Sampled: 9/23/96			Date Sampled:			Date Sampled:		
		Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor: 1.0			Dilution Factor:			Dilution Factor:		
		Percent Solid: NA %			Percent Solid: NA %			Percent Solid: NA %			Percent Solid: %			Percent Solid: %		
CRQL	Parameter	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual	SQL	Result	Qual
0.05	alpha-BHC	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U						
0.05	beta-BHC	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U						
0.05	delta-BHC	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U						
0.05	gamma-BHC (Lindane)	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U						
0.05	Heptachlor	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U						
0.05	Aldrin	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U						
0.05	Heptachlor Epoxide	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U						
0.05	Endosulfan I	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U						
0.1	Dieldrin	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U						
0.1	4,4'-DDE	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U						
0.1	Endrin	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U						
0.1	Endosulfan II	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U						
0.1	4,4'-DDD	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U						
0.1	Endosulfan Sulfate	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U						
0.1	4,4'-DDT	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U						
0.5	Methoxychlor	0.5	0.5	U	0.5	0.5	U	0.5	0.5	U						
0.1	Endrin Ketone	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U						
0.1	Endrin Aldehyde	0.1	0.1	U	0.1	0.1	U	0.1	0.1	U						
0.05	alpha-Chlordane	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U						
0.05	gamma-Chlordane	0.05	0.05	U	0.05	0.05	U	0.05	0.05	U						
5	Toxaphene	5	5	U	5	5	U	5	5	U						
1	Aroclor-1016	1	1	U	1	1	U	1	1	U						
2	Aroclor-1221	2	2	U	2	2	U	2	2	U						
1	Aroclor-1232	1	1	U	1	1	U	1	1	U						
1	Aroclor-1242	1	1	U	1	1	U	1	1	U						
1	Aroclor-1248	1	1	U	1	1	U	1	1	U						
1	Aroclor-1254	1	1	U	1	1	U	1	1	U						
1	Aroclor-1260	1	1	U	1	1	U	1	1	U						

Notes:

All units are µg/l.

Sample Quantitation Limit (SQL) is the CRQL multiplied by the dilution factor.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

R2-0000634

January 1997

SUMMARY OF INORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

TAL Metals

Matrix: Groundwater

Parameter	Sample Point MW-08R				Sample Point MW-10D				Sample Point MW-10R				Sample Point MW-11R			
	Date Sampled: 9/19/96				Date Sampled: 9/20/96				Date Sampled: 9/20/96				Date Sampled: 9/24/96			
	Dilution Factor: NA				Dilution Factor: NA				Dilution Factor: NA				Dilution Factor: NA			
	Percent Solid: NA %				Percent Solid: NA %				Percent Solid: NA %				Percent Solid: NA %			
	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual
Aluminum	200	28.2	174	B	200	28.2	193	B	200	28.2	348.0		200	28.2	361.0	
Antimony	60	2.2	2.2	U	60	2.2	3.5	B	60	2.2	2.2	U	60	2.2	2.2	U
Arsenic	10	2.3	2.3	U	10	2.3	2.6	B	10	2.3	2.3	U	10	2.3	2.3	U
Barium	200	0.2	73.4	B	200	0.2	40.9	B	200	0.2	25.7	B	200	0.2	34.3	B
Beryllium	5	0.1	0.1	U	5	0.1	0.1	U	5	0.1	0.1	U	5	0.1	0.1	U
Cadmium	5	0.3	0.3	U	5	0.3	0.31	B	5	0.3	0.3	B	5	0.3	0.3	U
Calcium	5000	11.0	308000		5000	11.0	88300		5000	11.0	91900.0		5000	11.0	120000.0	
Chromium	10	1.6	163		10	1.6	373		10	1.6	5.3	B	10	1.6	14.0	
Cobalt	50	0.5	0.57	B	50	0.5	0.54	B	50	0.5	0.5	U	50	0.5	0.5	U
Copper	25	1.8	10.7	B	25	1.8	8.6	B	25	1.8	4.5	B	25	1.8	10.4	B
Iron	100	25.5	114		100	25.5	162		100	25.5	354.0		100	25.5	362.0	
Lead	3	1.3	1.3	U	3	1.3	1.7	B	3	1.3	1.3	U	3	1.3	2.5	B
Magnesium	5000	4.3	14700		5000	4.3	527	B	5000	4.3	4170.0	B	5000	4.3	119.0	B
Manganese	15	0.5	6.6	B	15	0.5	4.3	B	15	0.5	14.9	B	15	0.5	3.7	B
Mercury	0.2	0.2	0.2	U	0.2	0.2	0.2	U	0.2	0.2	0.2	U	0.2	0.2	0.2	U
Nickel	40	1.6	15.7	B	40	1.6	13	B	40	1.6	6.0	B	40	1.6	4.3	B
Potassium	5000	29.4	38800	J	5000	29.4	41100	J	5000	29.4	3840.0	J	5000	29.4	10100.0	J
Selenium	5	3.0	3	U	5	3.0	3	U	5	3.0	3.0	U	5	3.0	3.0	UJ
Silver	10	0.6	0.6	UJ	10	0.6	0.6	UJ	10	0.6	0.6	UJ	10	0.6	0.6	U
Sodium	5000	214.0	144000		5000	214.0	82100		5000	214.0	36700.0		5000	214.0	46300.0	
Thallium	10	3.1	3.1	U	10	3.1	3.1	U	10	3.1	3.1	U	10	3.1	3.1	U
Vanadium	50	0.6	4.2	B	50	0.6	48.1	B	50	0.6	28.3	B	50	0.6	62.8	
Zinc	20	1.2	21.8	J	20	1.2	16.7	J	20	1.2	24.1	J	20	1.2	24.5	R
Cyanide	10	10.0	10	U	10	10.0	10	U	10	10.0	10.0	U	10	10.0	10.0	U

Notes:

All units are µg/l.

CRDL indicates Contract Required Detection Limit.

IDL is the Instrument Detection Limit.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

R2-0000635

January 1997

SUMMARY OF INORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

TAL Metals

Matrix: Groundwater

Parameter	Sample Point MW-14D				Sample Point MW-14R				Sample Point MW-14RD				Sample Point MW-15D			
	Date Sampled: 9/23/96				Date Sampled: 9/23/96				Date Sampled: 9/23/96				Date Sampled: 9/24/96			
	Dilution Factor: NA				Dilution Factor: NA				Dilution Factor: NA				Dilution Factor: NA			
	Percent Solid: NA %				Percent Solid: NA %				Percent Solid: NA %				Percent Solid: NA %			
	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual
Aluminum	200	28.2	544		200	28.2	167	B	200	28.2	173.0	B	200	28.2	389.0	
Antimony	60	2.2	2.2	U	60	2.2	2.2	U	60	2.2	2.2	U	60	2.2	2.2	U
Arsenic	10	2.3	8	B	10	2.3	3	B	10	2.3	2.6	B	10	2.3	2.3	U
Barium	200	0.2	61.4	B	200	0.2	16	B	200	0.2	16.7	B	200	0.2	108.0	B
Beryllium	5	0.1	0.1	U	5	0.1	0.1	U	5	0.1	0.1	U	5	0.1	0.1	U
Cadmium	5	0.3	0.48	B	5	0.3	0.3	U	5	0.3	0.3	B	5	0.3	0.3	U
Calcium	5000	11.0	103000		5000	11.0	170000		5000	11.0	168000.0		5000	11.0	123000.0	
Chromium	10	1.6	434		10	1.6	4	B	10	1.6	3.9	B	10	1.6	42.0	
Cobalt	50	0.5	0.58	B	50	0.5	0.5	U	50	0.5	0.5	U	50	0.5	0.5	U
Copper	25	1.8	22.1	B	25	1.8	3.3	B	25	1.8	4.3	B	25	1.8	8.9	B
Iron	100	25.5	135		100	25.5	1320		100	25.5	1310.0		100	25.5	290.0	
Lead	3	1.3	1.3	U	3	1.3	1.3	U	3	1.3	1.9	U	3	1.3	3.2	
Magnesium	5000	4.3	150	B	5000	4.3	9760		5000	4.3	9300.0		5000	4.3	1270.0	B
Manganese	15	0.5	2.9	B	15	0.5	36.8		15	0.5	35.3		15	0.5	6.5	B
Mercury	0.2	0.2	0.2	U	0.2	0.2	0.2	U	0.2	0.2	0.2	U	0.2	0.2	0.2	U
Nickel	40	1.6	9	B	40	1.6	3.6	B	40	1.6	5.9	B	40	1.6	18.9	B
Potassium	5000	29.4	101000	J	5000	29.4	2520	J	5000	29.4	2500.0	J	5000	29.4	14800.0	J
Selenium	5	3.0	4.1	J	5	3.0	3	UJ	5	3.0	3.0	UJ	5	3.0	3.0	UJ
Silver	10	0.6	0.6	U	10	0.6	0.6	U	10	0.6	0.6	U	10	0.6	0.6	U
Sodium	5000	214.0	120000		5000	214.0	36000		5000	214.0	35400.0		5000	214.0	55900.0	
Thallium	10	3.1	3.1	U	10	3.1	3.1	U	10	3.1	3.1	U	10	3.1	3.1	U
Vanadium	50	0.6	87.3		50	0.6	9.8	B	50	0.6	9.6	B	50	0.6	21.7	B
Zinc	20	1.2	54.3	R	20	1.2	68.2	R	20	1.2	73.9	R	20	1.2	32.2	R
Cyanide	10	10.0	10.9		10	10.0	10	U	10	10.0	10.0	U	10	10.0	10.0	U

Notes:

All units are µg/l.

CRDL indicates Contract Required Detection Limit.

IDL is the Instrument Detection Limit.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

R2-0000636

January 1997

SUMMARY OF INORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Matrix: Groundwater

Sample Results
TAL Metals

Parameter	Sample Point MW-16D				Sample Point MW-17D				Sample Point MW-18D				Sample Point MW-18DD			
	Date Sampled: 9/23/96				Date Sampled: 9/19/96				Date Sampled: 9/19/96				Date Sampled: 9/19/96			
	Dilution Factor: NA				Dilution Factor: NA				Dilution Factor: NA				Dilution Factor: NA			
Parameter	Percent Solid: NA %				Percent Solid: NA %				Percent Solid: NA %				Percent Solid: NA %			
	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual
Aluminum	200	28.2	246		200	28.2	531		200	28.2	203.0		200	28.2	219.0	
Antimony	60	2.2	2.2	U	60	2.2	2.2	U	60	2.2	2.2	U	60	2.2	2.2	U
Arsenic	10	2.3	2.3	U	10	2.3	2.3	U	10	2.3	2.3	U	10	2.3	2.3	U
Barium	200	0.2	184	B	200	0.2	64.6	B	200	0.2	35.4	B	200	0.2	35.1	B
Beryllium	5	0.1	0.1	U	5	0.1	0.1	U	5	0.1	0.1	U	5	0.1	0.1	U
Cadmium	5	0.3	0.3	U	5	0.3	0.34	B	5	0.3	0.3	U	5	0.3	0.3	U
Calcium	5000	11.0	224000		5000	11.0	254000		5000	11.0	297000.0		5000	11.0	296000.0	
Chromium	10	1.6	2.1	B	10	1.6	6.1	B	10	1.6	3.2	B	10	1.6	2.5	B
Cobalt	50	0.5	0.5	U	50	0.5	1.7	B	50	0.5	0.9	B	50	0.5	1.0	B
Copper	25	1.8	5.8	B	25	1.8	4.7	B	25	1.8	6.3	B	25	1.8	6.1	B
Iron	100	25.5	41.9	B	100	25.5	945		100	25.5	138.0		100	25.5	128.0	
Lead	3	1.3	1.9	B	3	1.3	1.3	U	3	1.3	1.3	U	3	1.3	1.9	B
Magnesium	5000	4.3	4570	B	5000	4.3	57300		5000	4.3	48500.0		5000	4.3	48500.0	
Manganese	15	0.5	3.1	B	15	0.5	1360		15	0.5	318.0		15	0.5	319.0	
Mercury	0.2	0.2	0.2	U	0.2	0.2	0.2	U	0.2	0.2	0.2	U	0.2	0.2	0.2	U
Nickel	40	1.6	4.4	B	40	1.6	41.5		40	1.6	29.4	B	40	1.6	30.6	B
Potassium	5000	29.4	12100	J	5000	29.4	7640	J	5000	29.4	5690.0	J	5000	29.4	5690.0	J
Selenium	5	3.0	3	UJ	5	3.0	3	U	5	3.0	3.0	U	5	3.0	3.0	U
Silver	10	0.6	0.6	U	10	0.6	0.6	UJ	10	0.6	0.6	UJ	10	0.6	0.6	UJ
Sodium	5000	214.0	93100		5000	214.0	244000		5000	214.0	199000.0		5000	214.0	199000.0	
Thallium	10	3.1	3.1	U	10	3.1	3.1	U	10	3.1	3.1	U	10	3.1	3.1	U
Vanadium	50	0.6	10	B	50	0.6	1.9	B	50	0.6	4.8	B	50	0.6	4.7	B
Zinc	20	1.2	50.6	R	20	1.2	13.7	J	20	1.2	18.4	J	20	1.2	31.8	J
Cyanide	10	10.0	10	U	10	10.0	10	U	10	10.0	10.0	U	10	10.0	10.0	U

Notes:

All units are µg/l.

CRDL indicates Contract Required Detection Limit.

IDL is the Instrument Detection Limit.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

R2-0000637

January 1997

SUMMARY OF INORGANICS ANALYSES

943-6222

Matrix: Groundwater

216 Paterson Plank Road Site
Sample Results
TAL Metals

Parameter	Sample Point PW-01				Sample Point				Sample Point				Sample Point			
	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual	CRDL	IDL	Result	Qual
Aluminum	200	28.2	238													
Antimony	60	2.2	2.2	U												
Arsenic	10	2.3	2.3	U												
Barium	200	0.2	68.2	B												
Beryllium	5	0.1	0.1	U												
Cadmium	5	0.3	0.3	U												
Calcium	5000	11.0	35100													
Chromium	10	1.6	1.6	U												
Cobalt	50	0.5	0.5	U												
Copper	25	1.8	21.6	B												
Iron	100	25.5	27	B												
Lead	3	1.3	1.9	B												
Magnesium	5000	4.3	6770													
Manganese	15	0.5	7.7	B												
Mercury	0.2	0.2	0.2	U												
Nickel	40	1.6	3	B												
Potassium	5000	29.4	1970	J												
Selenium	5	3.0	3	UJ												
Silver	10	0.6	0.6	U												
Sodium	5000	214.0	37000													
Thallium	10	3.1	3.1	U												
Vanadium	50	0.6	0.93	B												
Zinc	20	1.2	38.6	R												
Cyanide	10	10.0	10	U												

Notes:

All units are µg/l.

CRDL indicates Contract Required Detection Limit.

IDL is the Instrument Detection Limit.

The Qual column indicates the qualifier applied to the result following data validation.

NA indicates Not Applicable.

MW-14RD is a field duplicate of MW-14R.

MW-18DD is a field duplicate of MW-18D.

January 1997

SUMMARY OF INORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Indicator List Parameters

Matrix: Groundwater

	Sample Point MW-08R		Sample Point MW-10D		Sample Point MW-10R		Sample Point MW-11R		Sample Point MW-14D	
	Date Sampled: 9/19/96		Date Sampled: 9/20/96		Date Sampled: 9/20/96		Date Sampled: 9/24/96		Date Sampled: 9/23/96	
	Dilution Factor: NA		Dilution Factor: NA		Dilution Factor: NA		Dilution Factor: NA		Dilution Factor: NA	
	Percent Solid: NA %		Percent Solid: NA %		Percent Solid: NA %		Percent Solid: NA %		Percent Solid: NA %	
Parameter	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Alkalinity	35.2		73.5		36.8		121		150	
Chloride	635		28.8		78.4		60.5		80.2	
Ethane	100	U	100	U	100	U	100	U	100	U
Ethene	100	U	100	U	100	U	100	U	100	U
Methane	135		100	U	100	U	100	U	100	U
Nitrate-Nitrite	0.1	U	0.1	U	0.1	U	0.1	UJ	0.18	J
Phosphorus, Total	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Sulfate	251		330		181		221		393	
Sulfide	2	U	2	U	2	U	3		3.1	
TKN	0.35		0.45		0.21		1.3		1.1	
Total Organic Carbon	3.6		1.4		1.2		5.3	J	3.6	J
Dissolved Iron	25.5	U	25.5	U	25.5	U	25.5	U	25.5	U

Notes:

All units are mg/l except for the following: Ethane, Ethene, Methane, and Dissolved Iron.

The Qual column indicates the qualifier applied by the laboratory to the result following data validation.

NA indicates Not Analyzed.

Sample ID MW-14RD is field duplicate of MW-14R.

Sample ID MW-18DD is field duplicate of MW-18D.

January 1997

SUMMARY OF INORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Indicator List Parameters

Matrix: Groundwater

	Sample Point MW-14R		Sample Point MW-14RD		Sample Point MW-15D		Sample Point MW-16D		Sample Point MW-17D	
	Date Sampled: 9/23/96		Date Sampled: 9/23/96		Date Sampled: 9/24/96		Date Sampled: 9/23/96		Date Sampled: 9/19/96	
	Dilution Factor: NA		Dilution Factor: NA		Dilution Factor: NA		Dilution Factor: NA		Dilution Factor: NA	
	Percent Solid: NA %		Percent Solid: NA %		Percent Solid: NA %		Percent Solid: NA %		Percent Solid: NA %	
Parameter	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Alkalinity	16.4		15.8		214		172		257	
Chloride	90.3		91.3		22.3		372		653	
Ethane	100	U	100	U	100	U	100	U	100	U
Ethene	100	U	100	U	100	U	100	U	100	U
Methane	100	U	100	U	100	U	323		100	U
Nitrate-Nitrite	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U
Phosphorus, Total	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Sulfate	492		379		181		112		228	
Sulfide	2	U	2	U	2	U	2	U	2	U
TKN	0.2	U	0.2	U	0.2	U	0.2		0.26	
Total Organic Carbon	1	U	1	U	1	U	1.5	J	3.5	
Dissolved Iron	25.5	U	25.5	U	25.5	U	25.5	U	277	

Notes:

All units are mg/l except for the following: Ethane, Ethene, Methane, and Dissolved Iron.

The Qual column indicates the qualifier applied by the laboratory to the result following data validation.

NA indicates Not Analyzed.

Sample ID MW-14RD is field duplicate of MW-14R.

Sample ID MW-18DD is field duplicate of MW-18D.

January 1997

SUMMARY OF INORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Indicator List Parameters

Matrix: Groundwater

Parameter	Sample Point MW-18D Date Sampled: 9/19/96 Dilution Factor: NA Percent Solid: NA %		Sample Point MW-18DD Date Sampled: 9/19/96 Dilution Factor: NA Percent Solid: NA %		Sample Point Date Sampled: Dilution Factor: Percent Solid: %		Sample Point Date Sampled: Dilution Factor: Percent Solid: %		Sample Point Date Sampled: Dilution Factor: Percent Solid: %	
	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Alkalinity	147		142							
Chloride	717		722							
Ethane	100	U	100	U						
Ethene	100	U	100	U						
Methane	100	U	100	U						
Nitrate-Nitrite	0.1	U	0.1	U						
Phosphorus, Total	0.1	U	0.1	U						
Sulfate	263		256							
Sulfide	2	U	2	U						
TKN	0.3		0.26							
Total Organic Carbon	2.8		2.9							
Dissolved Iron	25.5	U	NS							

Notes:

All units are mg/l except for the following: Ethane, Ethene, Methane, and Dissolved Iron.

The Qual column indicates the qualifier applied by the laboratory to the result following data validation.

NA indicates Not Analyzed.

Sample ID MW-14RD is field duplicate of MW-14R.

Sample ID MW-18DD is field duplicate of MW-18D.

January 1997

SUMMARY OF INORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Indicator List Parameters

Matrix: Groundwater

Parameter	Sample Point MW-02D		Sample Point MW-02R		Sample Point MW-05D		Sample Point MW-07D		Sample Point MW-08D	
	Date Sampled: 9/17/96		Date Sampled: 9/18/96		Date Sampled: 9/18/96		Date Sampled: 9/18/96		Date Sampled: 9/18/96	
	Dilution Factor: NA		Dilution Factor: NA		Dilution Factor: NA		Dilution Factor: NA		Dilution Factor: NA	
	Percent Solid: NA %		Percent Solid: NA %		Percent Solid: NA %		Percent Solid: NA %		Percent Solid: NA %	
	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Alkalinity	22.6		37.3		26.2		32.6		38.3	
Chloride	754		615		385		43.9		454	
Ethane	100	U	100	U	100	U	100	U	100	U
Ethene	100	U	100	U	100	U	100	U	100	U
Methane	287		125		104		100	U	474	
Nitrate-Nitrite	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Phosphorus, Total	0.1	U	0.1	U	0.1	U	0.1	U	0.14	
Sulfate	191		192		305		338		366	
Sulfide	2	U	2	U	2	U	2	U	2	U
TKN	0.24		0.2	U	0.37		0.4	U	0.26	
Total Organic Carbon	1	U	1	U	1	U	1	U	1.3	
Dissolved Iron	25.5	U	25.5	U	25.5	U	25.5	U	25.5	U

Notes:

All units are mg/l except for the following: Ethane, Ethene, Methane, and Dissolved Iron.

The Qual column indicates the qualifier applied by the laboratory to the result following data validation.

NA indicates Not Analyzed.

January 1997

SUMMARY OF INORGANICS ANALYSES

943-6222

216 Paterson Plank Road Site

Sample Results

Indicator List Parameters

Matrix: Groundwater

Parameter	Sample Point MW-11D		Sample Point MW-12D		Sample Point RMW-13D		Sample Point		Sample Point	
	Date Sampled: 9/24/96		Date Sampled: 9/23/96		Date Sampled: 9/23/96		Date Sampled:		Date Sampled:	
	Dilution Factor: NA		Dilution Factor: NA		Dilution Factor: NA		Dilution Factor:		Dilution Factor:	
	Percent Solid:	NA %	Percent Solid:	NA %	Percent Solid:	NA %	Percent Solid:	%	Percent Solid:	%
Parameter	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Alkalinity	36.9		267		39.6					
Chloride	189		494		308					
Ethane	100	U	100	U	100	U				
Ethene	100	U	100	U	100	U				
Methane	599		505		369					
Nitrate-Nitrite	0.1	UJ	0.1	UJ	0.1	UJ				
Phosphorus, Total	0.1	U	0.1	U	0.1	U				
Sulfate	204		63.8		227					
Sulfide	2	U	2	U	2	U				
TKN	0.2	U	0.2		0.2	U				
Total Organic Carbon	1.5		2.6	J	1	U				
Dissolved Iron	25.5	U	223		25.5	U				

Notes:

All units are mg/l except for the following: Ethane, Ethene, Methane, and Dissolved Iron.

The Qual column indicates the qualifier applied by the laboratory to the result following data validation.

NA indicates Not Analyzed.